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NAME OF AUTHOR/*NOM DE L'AUTEUR* J. Rodney Millard

TITLE OF THESIS/*TITRE DE LA THÈSE* The Development of the Engineering Profession in Canada, 1880 - 1920

UNIVERSITY/*UNIVERSITÉ* University of Toronto

DEGREE FOR WHICH THESIS WAS PRESENTED/*GRADE POUR LEQUEL CETTE THÈSE FUT PRÉSENTÉE* Ph.D

YEAR THIS DEGREE CONFERRED/*ANNÉE D'OBTENTION DE CE GRADE* 1982

NAME OF SUPERVISOR/*NOM DU DIRECTEUR DE THÈSE* R C Brown

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THE DEVELOPMENT OF THE ENGINEERING PROFESSION IN CANADA

1880 - 1920

by

J. Rodney Millard

A Thesis submitted in conformity with the requirements
for the Degree of Doctor of Philosophy
at the University of Toronto

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I

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ABBREVIATIONS

AAE	American Association of Engineers
AIEE	American Institute of Electrical Engineers
APEO	Association of Professional Engineers of Ontario
ASCE	American Society of Civil Engineers
BCTA	British Columbia Technical Association
CAE	Canadian Association of Engineers
CMI	Canadian Mining Institute
CSA	Canadian Standards Association
CSC	Civil Service Commission
CSCE	Canadian Society of Civil Engineers
DIAE	Dominion Institute of Amalgamated Engineering
EIC	Engineering Institute of Canada
ICE	Institution of Civil Engineers
JCTO	Joint Committee of Technical Organizations
OALS	Ontario Association of Land Surveyors
RCI	Royal Canadian Institute

INTRODUCTION

Engineers were both the agents and the victims of Canada's transformation from a rural-agrarian country to an urban-industrial nation. They developed the mineral, forest and hydro-electric resources; constructed the vital transportation networks; presided over the rise of the cities and laid the foundations of Canada's modern mechanical, electrical and chemical industries. They saw themselves in the van of history as the foremost participants in a dramatic national adventure and believed that they had a special destiny to fulfil. At the same time, however, engineers felt unrecognized and unrewarded. Although they possessed expertise essential to the new urban-industrial order, as salaried employees they could neither control their destiny nor protect themselves from competition. Unlike the practice of law and medicine, engineering had no legal standing. Anyone could practise. To raise their status, engineers adopted a strategy of professional development. Professionalism was a uniquely middle-class solution to the uncertainty and insecurity accompanying rapid industrialization. It was distinct from and, in some respects, more effective than other contemporary collectivist movements, such as trade unions, or business cartels.

This study examines the engineer's attempt to acquire power and prestige. It is primarily a history of engineers, rather than an analysis of professionalization. While many engineers liked to think of themselves as independent professionals, they differed substantially from the older, pre-industrial, consultative professionals. In background, status and outlook, engineers were part of an emerging new breed of urban middle-class experts — administrators, foresters, town-planners, public health advocates, educators, social workers and others — who rose to prominence during Canada's great transformation. Engineers formed the vanguard of this 'new middle-class'. They personified its spirit and aspirations. An examination of the development of their ideas, institutions and politics, leads to a better understanding of how Canadians adjusted to industrialization.

Chapter I

"THE MASTER SPIRIT OF THE AGE"

THE ENGINEER AND HIS WORLD

Canadian engineers did not regard themselves as philosophers. They believed that they were practical men of action, not thinkers. According to Sandford Fleming, they were accustomed to "dealing less with words than with deeds ..."[1] They were distrustful of doctrine and contemptuous — sometimes envious — of the more articulate members of society. Few seemed to have either the time or the inclination for much non-technical writing. There were a few notable exceptions, of course, the most celebrated being T.C. Keefer and the engineer-historian, William Kingsford.[2] Occasionally, some abstract subjects were attempted, such as C.E.W. Dodwell's extraordinary treatise, Righteousness Versus Religion, but without much popular success or critical acclaim. Nevertheless, in their speeches, articles and letters, Canadian engineers periodically made philosophical statements which revealed a unique Weltanschauung. When arranged logically, these statements roughly outlined the engineer's vision of the world. This vision, however, reflected the view of a small minority of articulate engineers, mostly engineering leaders, journalists and educators. They functioned as the profession's thinkers and spokesmen and generally formulated the ideas which were accepted by most rank and file engineers.

Canadian engineers were not very accomplished ideologists. Their ideas were largely derivative of British and, especially, American engineers[3] and their analysis was often superficial and unsystematic. Their arguments tended to be ill-conceived and naive, more polemical than analytical, and were sometimes confused, even contradictory. Yet, in spite of their shortcomings as philosophers, engineers developed a distinct and remarkable philosophy that stressed the pre-eminence of technicians in an industrial society.

I

Engineers viewed Canada as a vast engineering frontier. "No matter to which section of Canada you turn", observed the Canadian Engineer in 1908, "crude forests and huge stores of natural wealth lie ready to lend themselves to processes that create wealth and concern themselves with the larger movements of human progress ..."[4] Canada's destiny lay in the scientific development of this immense natural wealth. In turn, this would place Canada in the forefront of modern civilized nations. "It only remains", declared one enthusiast, "for these resources to be ascertained and properly developed to place this country in a foremost position as a great trading nation ..."[5] Canada's potential was virtually unlimited and it was confidently assumed that Canada would soon rival the United States as an economic power.[6] In his retiring Presidential Address to the Toronto Engineers' Club, C.M. Canniff asserted that for years Canada had been "a poor relation to England", overshadowed by the United States. But with the return of prosperity after 1896, Canada had come to the attention of the whole world; "at last", Canniff declared, "the Dominion is coming into its own".[7] It was Canada's turn to assume her rightful position among the great industrial nations.

No other group of Canadians were in such direct and constant contact with the physical evidence of substantial material improvements as engineers. They saw history as a splendid record of growth and improvement. "In Canada", announced Sandford Fleming, "we are in a constant state of general and continuing development. Year by year we advance forward as our fathers did before us ..."[8] Science and technology were the keys to achieving progress. Engineers had boundless faith in the capacity of applied science[9] to substantially improve the material and moral condition of Canadians. They were the consummate apostles of progress.[10] The practical application of science to Canada's natural resources, they believed, would not only transform the country into a modern industrial utopia, it would also provide a series of blessings from increased population to cheap consumer goods and the amelioration of social evils associated with industrialism.[11]

Canada's immense unexploited natural resources and tremendous industrial potential excited engineers' imagination and provided them with a great mission: the transformation of Canada from a backward wilderness into a powerful industrial nation. They accepted this noble calling with evangelical fervour and boldly appointed themselves, as one engineer observed, "the guardians of the whole industrial development of the country".[12]

Canada's resources, moreover, provided engineers with an opportunity, as well as a mission. According to an engineering journalist: "Canada is pre-eminently the engineer's country".

> The vast extent of the country, its magnificent lakes and rivers, its agricultural and mineral riches, its forests, and unrivalled waterpower, and many other potential sources of future wealth and progress furnish exceptional incentives and opportunities to the engineer.[13]

Canniff remembered that the Twentieth century belonged to Canada and, going beyond Laurier, proclaimed that the "Twentieth century belongs also to the engineer ..."[14]

The engineer's sense of mission was not confined to narrow nationalistic objectives. As Canadian nationalists, they also had a broader Imperial vision. Before the First World War, many engineers expressed the belief that Canada's future lay within the British Empire. By building a strong industrial economy, they felt they were strengthening the Empire. As engineers, they had a special mission to unite the Empire physically with transportation and communication works.[15] Unlike some other Canadian imperialists, however, engineers had no reservations about industrialism, no arcane longing for a more virtuous agrarian past, or even fear of social disorder arising from industrial evils. Industrialism, like the Empire, was *a priori* good.

Thus, Canadian engineers had a profound sense that they were major participants in a dramatic national adventure. Armed with the conviction that they were the guardians of Canada's industrial development, they marched forth with crusading zeal as the shock troops of British civilization to battle all the stubborn adversity of nature, in the name of Progress and the Empire. At the same time, however, they also realized that not all Canadians shared their vision and appreciated the advantages of technology. They were convinced that unprogressive and reactionary forces were impeding Canada's industrial progress and thwarting their mission.

II

Engineers were deeply alarmed about the lack of industrial and political leadership in Canada. Everywhere they looked they saw inefficiency and mismanagement. They believed that this undermined Canadian society and stifled national industrial progress. They felt that many of society's fundamental values had been eroded. In his Presidential Address to the Engineering Institute of Canada, in January, 1920, Col. R.W. Leonard observed that

> A few years ago it would have been unnecessary to deal with the fundamentals of our civilization; they were so imbued in our brains that it was almost silly to formulate them into words. We rested securely in the belief that "Truth is might and will prevail". Of late, however, so much false teaching and distortion of fundamental truths had been disseminated, and accepted by so many, that downtrodden Truth would appear to need the assistance of some Minister of Propaganda if she is to hold her place and prevail before the structure of our civilization is badly shaken ...[16]

Much of this "false teaching", according to Leonard, was spread by sensationalist newspapers[17] that printed exaggerated reports of profits and corrupt business practices of a few large companies.[18] Engineers believed, like many businessmen, that the labour movement had been radicalized and controlled by revolutionaries. Youthful and inexperienced union leaders made unrealistic and irresponsible wage demands, which they neither deserved, nor could business afford, because of the iron law of wages.[19] Strikes and labour violence resulted.

The dramatic rise in industrial conflict, climaxing in the Winnipeg General Strike, frightened engineers. They believed that industrial strife had far reaching consequenoes. Not only did it harm employers and workers,[20] it also constituted a direct assault on society. "On our continent", Leonard declared, "we have today attempts by the ignorant and misguided to destroy both the foundations and arch stones of our industry and civilization ..."[21] Some engineers were even suspicious that their colleagues, not just the working class, were vulnerable to pernicious ideas. Amid the post war hysteria, generated by the Bolshevik revolution and the Winnipeg General Strike, one engineer feared that "minor and inferior elements in the profession, if not dominated by its intellectual elders, may stray into the wilderness of chaotic thinking ..."[22]

In their approach to labour unrest and other problems, engineers' social thought was deeply influenced by their belief in a Newtonian universe ruled by immutable natural laws which governed man and the physical world. Universal social principles, like physical laws, could be ascertained scientifically by the same objective and rational methods that engineers applied to engineering. Education, especially technical education, enabled man to perceive correctly universal social principles through rational thinking. Engineers divided society broadly between the educated progressive forces and the unenlightened unprogressive elements. They assumed that they were the foremost members of an elite community of right thinking progressive men. They were singular in this conviction and untroubled by doubt. According to E.T. Clark, engineers were "accustomed to dealing with facts and immutable natural laws, they feel instinctively that there is about everything a definite position which must be right; what differs from it is wrong".[23]

Engineers viewed the economy almost as if it were a complex machine that functioned properly when operated in conformity with correct design specifications. Malfunctions, they believed, arose from minor disorders and were amenable to objective analysis and rational solutions. Labour conflict, they thought, was not caused by faulty design, since the economy, in spite of its shortcomings, was fundamentally sound. Capitalism, like progress, was accepted by engineers on faith as an accurate reflection of the natural order of things. Industrial conflict arose from ignorance of a fundamental principle: capital and labour were mutually inter-dependent, integral parts of Canada's developing industrial economy. Peaceful co-existence and industrial progress hinged upon the mutual recognition of this principle.[24]

The ordinary working man, if properly guided with sound principles, for example, was content and loyal to his employer.[25] His lack of education, however, made him susceptible to the pernicious propaganda of "irresponsible self-seeking agitators",[26] who easily led him astray, often on the pretext of "alleged grievances".[27] Only by countering the agitators' insidious propaganda with reason and sound principles, could labour unrest be averted.[28] Col. Leonard warned that "until wise heads in the unions get together, take control and educate the others along lines of duty and honest service to their fellow man, there will be no industrial peace".[29] Unfortunately, even at this critical juncture in Canada's development, when various reactionary forces threatened to undermine society, engineers had little confidence in political leaders to restore order and to foster progress.

They were repelled by government corruption and scandals. They believed that public affairs at all levels of government were being mismanaged. The Electrical News observed that

> Every live Canadian has a growing feeling of unrest and dissatisfaction at the methods adopted in the management of our various public affairs. Charges of graft are becoming everyday matters; evidences of incompetence in our administrations are available on all sides; proof unmistakable in its directness, that the public good is being placed in a secondary position to the demands of party politics or personal gain ...[30]

In a society so heavily dominated by partisan politics, engineers had developed an aversion to politics. T.C. Keefer considered himself to be a casualty of politics[31] and, in the continuing tradition of Canada First's hostility to party politics, Sandford Fleming bitterly attacked "partyism" and became a staunch advocate of electoral and parliamentary reform.[32] He cautioned his colleagues not to mingle with politics in their debased condition.[33]

Most engineers sensed that there was something fundamentally wrong with Canadian democracy. As one engineer asserted: "the manifest tendency of the times is to put more and more power in the hands of the ignorant and uneducated".[34] Although most engineers tacitly accepted democracy as an ideal, provided the electorate was well educated and informed, they had little confidence in the intelligence of the ordinary voter.[35] Suspicious of the American ideal of majority rule and inclined toward conservative and monarchical principles of order and authority, they feared that, with the aid of the sensationalist press, personable and articulate demagogues could be elected by arousing the baser instincts of the "ignorant and uneducated".[36] Once elected, political interest supplanted the public interest.

Much of the engineers' hostility to democracy was directed to municipal government.[37] In an "age of efficiency",[38] engineers were highly critical of the fact that cities were controlled by popularly elected amateurs — ward aldermen. Judged against the professional standard of the City Manager concept, they commonly portrayed aldermen in a crude one-dimensional stereotype: lower class, self-seeking, unprogressive and unproductive. Engineers maintained that, as failed businessmen or ambitious tradesmen seeking personal notoriety through politics, most aldermen were incompetent civic administrators, because their main qualification for office was political, rather than technical or administrative ability. Ignorant of the technical aspects of municipal administration, engineers believed that aldermen decided vital public issues on political, not technical grounds.[39] This adversely affected and eventually retarded Canadian urban progress.

Rejecting parliamentary methods of government as inefficient, engineers were inspired by the management techniques of an efficiently run modern business corporation with its clearly defined hierarchical lines of authority, long term planning, continuity of management and, above all, decision making by experts based on objective and rational considerations. By contrast, parliamentary governments were the antithesis of this ideal and engineers developed a contemptuous disdain for them, a regard reinforced by the inefficiency, patronage and corruption rampant in many levels of government. Ideally, engineers preferred government by experts. They endorsed the City Manager, or Commission Government concept,[40] a panacea which promised to take politics out of municipal administration and stressed expertise, rationality, efficiency and security of tenure. According to R.A. Ross, President of the Engineering Institute of Canada and Montreal City Commissioner, the City Manager had

> no election pledges to keep and no dependence upon the fickle and foolish decisions of the voter, but [was] free to carry out as a real manager the necessary work of the community in the same way as the manager of a company.[41]

In many respects, the engineer's advocacy of Commission Government and, earlier, their critique of municipal government, was inspired by the urban reform movement sweeping Canada between 1890 and 1920.[42] Engineers sided with the commercial elite of many cities in an effort to have civic affairs run in a more efficient, business-like manner.[43] Motivated by a high degree of self interest and employing popular democratic reform rhetoric, engineers and prominent businessmen attempted to lessen popular participation in municipal government by minimizing the power of local ward politicians.[44]

At the same time, however, engineers differed from the mainstream of contemporary urban reform thought. Whereas businessmen reformers viewed the city as a corporate enterprise and justified reform in the name of the people, engineers viewed the city, especially city government, almost exclusively in engineering terms. "City government", the Canadian Engineer explained, "is largely an aggregation of engineering problems ..."[45] If a city were properly designed and maintained by knowledgeable experts, it would function smoothly with orderly precision. Engineers were less interested in the human aspect of urban reform and did not rationalize their actions in terms of the commonweal. Their sole concern was to eradicate inefficiency from municipal government. They justified efficiency for its own sake and reasoned that, if city governments were well run, the public, in turn, would be well served.

III

While engineers had no faith in Canadian political leaders, they also believed that other groups — particularly business and professional men — were unfit to lead a modern industrial society. They set themselves up as the standard against which leadership was measured and tended to judge other callings by their rigid materialistic values, because they assumed that engineering had greater practical value for humanity. In their view, the older learned professions — theology, medicine and law, for example — were anachronistic, doing little to advance society's material progress.

Although engineers acknowledged the clergy's authority in earlier times and probably accepted their spiritual guidance, they nevertheless regarded this profession with respectful, yet mild condescension. This attitude was not prompted by anti-clericalism, but arose from an assessment of the clergy's relative social importance. While the church was considered to be a legitimate, though declining institution, its other-worldliness probably appeared irrelevant amid the materialism of modern industrial society.

Medicine was considered to be more progressive than theology, since it was more practical;[46] but its social importance was proscribed by the scope of its responsibility. "The physician", argued consulting engineer Walter J. Francis, "heals the sick and deals with individuals while the engineer holds in his hand the health of towns, cities and nations ..."[47] A doctor's responsibility was individual; an engineer's, collective. Moreover, doctors could easily elude blame for professional incompetence. An engineer, however, had no escape; his structures were material and stood openly on their own merits. If a train crashed through a badly designed and constructed bridge, he alone was responsible.[48] As Francis put it: "A doctor buries his mistakes. The engineer erects monuments to his ability or lack of it ..."[49]

Law was regarded as the least productive of the learned professions. Lawyers did not create wealth. They lived off surplus wealth and profited from the misfortune of others. They were unprogressive since they looked to past precedent, rather than future potential. The Canadian Engineer maintained that

> the average lawyer's mind is dilatory, bound with red tape, tied by precedent. It does not create, it takes advantage of minute divisions and side issues. It is bound by the shackles of the past in an extraordinary manner. It cannot organize and its achievements are verbal triumphs, not executive deeds ...[50]

By contrast, the engineer possessed a "creative mind".

> He walks verily among the teaming possibilities which surround him. He is a cautious selector, never prone to haste, but progressive in general trend. Sufficiently conservative not to adopt unproven remedies or devices, he is willing to consider any new possibility in the light of past experience and technical judgment. He looks to the future more than to the past, while he does not despise precedent — more often than not he creates precedent by further advance. No other modern mind has quite the same cast ...[51]

Not only were lawyers regressive, they were confined to man-made provincial boundaries, while engineering was practised universally like science. While lawyers became tangled in a web of man-made laws, engineers were in touch with a more perfect order — natural law.[52]

Engineers also dismissed businessmen. Like lawyers, businessmen did not create wealth. Merchants and bankers, the Canadian Engineer argued, were only mediums of exchange, not true producers.[53] While businessmen accumulated wealth, engineers, according to the Contract Record, were "engaged in building larger, better and more lasting structures than 'fortunes'".[54] It was the engineer who designed and built the means of production, provided power and raw materials and organized production and distribution.[55] Walter J. Francis believed that there were two classes in society: producers and non-producers. Real estate brokers and speculators were the lowest of the non-producers, while engineers headed the producers. Other callings fell somewhere in between these extremes. Farmers were occasionally included among the select group of producers, because of the need for food and clothing;[56] but labour's classic claim to be the true producers of wealth was ignored. Engineers perhaps assumed that, without their machines and management, labour could not produce anything.

Undoubtedly the most fundamental tenet in the engineers' creed was the belief that they had created the modern industrialized world and fostered its material development. Walter J. Francis asserted that

> It is the engineer who harnesses the Niagaras of the world to transform the night of our cities into noonday, and to turn the wheels of commerce. It is the engineer who develops the mining and furnishes the metal with which he builds machines that by their ingenuity compel us to stand in awe and admiration. It is the engineer who produces the steel to form a network of highways over our continents and that makes possible the myriads of floating palaces on our oceans. It is the engineer who abolished famine and pestilence. It is the engineer who has annihilated distances with his telegraph and his telephone. It is the engineer who has made possible the conquest of the air.[57]

They had raised humanity from the darkness of semi-barbarism to the enlightened civility of the industrial age. "The human race", declared E.H. Keating in his President's Address to the Canadian Society of Civil Engineers, "would still be clothing itself with the skins of animals, using stone implements and dwelling in caves or wigwams ..." but for the engineers.[58] The civilized world, many engineers believed, was dependent on engineers; without them, government could not function and the modern world would be, according to Walter J. Francis, "immediately plunged into the darkness of the middle ages".[59]

Finding others wanting, compared with themselves, engineers simply concluded that only they were society's natural leaders. By the First World War, they were confidently asserting that they were uniquely qualified to manage public affairs. This conviction was predicated on the notion that the major problems affecting Canada were essentially engineering problems.[60] By implication, only the engineer, who possessed the technical knowledge, training and experience, was capable of leading society and solving its problems.[61] Assuming that social problems, like engineering problems, were amenable to scientific solutions, engineers proposed to apply science to society. In short, they simply intended to engineer society. As one engineer proclaimed: "statescraft is merely national engineering".[62]

Engineers would bring to public life the combined advantages of their training in applied science and their extensive managerial experience. The engineer's mind, they argued, was schooled to solve practical problems scientifically.[63] As senior corporation executives and managers of various industrial and engineering concerns, they were experienced organizers, skilled in co-ordinating large numbers of men into, as one engineer put it, "effective human machines".[64] While lawyers and politicians had failed to resolve industrial conflict, for example, engineers, occupying a neutral position, intermediate between capital and labour, were accustomed to dealing effectively with labour. After all, industrial relations was merely a problem in "human engineering".[65]

Engineers would also bring morality to public life. Amid the corruption and duplicity of party politics and the unrestrained exploitation of the country's natural resources, engineers, like farmers, had a moral vision of themselves as producers and guardians of the nation's natural wealth. They were honest and honourable men,[66] uncorrupted and incorruptible — "The engineer's clean wholesome mind", wrote a Toronto civil engineer, "the sterling character derived from his close association with nature, would in great measure tend to elevate the trend of politics in this country ..."[67] By training and disposition, the engineer was non-political and non-partisan.[68] All judgments involving the public interest would be made objectively, consistent with the principles of efficiency and public utility.

That engineers, not elected representatives, should lead society, was not regarded as a particularly revolutionary, or even radical doctrine. The notion stemmed from conservative precepts of order and authority and was considered to be a progressive ideal, uniquely suited to a modern industrial society. In an "engineering age",[69] engineers reasoned that government problems were essentially technical problems. While politicians were elected, they were not experts; they were forced to rely on engineers for advice. Good government — economy and efficiency — depended on sound technical advice. "Thus in the end", the Contract Record concluded, "responsibility rests upon the shoulders of the expert ..."[70] The engineer, not the politician was ultimately responsible to the people. To this extent, engineers were already *de facto* leaders.

While Canadian engineers ultimately expected to rule society, they had no manifesto, no doctrine of radical social engineering, nor master plan to transfer production-distribution from businessmen to engineers and organize society on a technical basis. They were hardly a 'Soviet of Technicians' or the indispensible 'General

Staff' of the industrial system envisaged by Thorstein Veblen.[71] They lacked strong messianic leaders like the American engineer-technocrat, Howard Scott, and they were unassertive and highly conservative — almost apolitical. They neither expected nor condoned revolution.

Although engineers had no plans to assume power, their philosophy did reflect their aspirations. The City Manager panacea, for example, was never seriously promoted by any organized engineering group. It remained essentially an abstract concept in the engineer's mind, rather than a practical objective. Its real significance was its symbolic appeal. Rejecting the traditional entrepreneurial and professional ideals, engineers identified instead with the City Manager. The City Manager represented a unique ideal that defined their role and embodied their aspirations. This non-elected, non-partisan expert, who rationally and objectively managed the city with business-like efficiency, was ultimately the personification of the engineering ideal — the quintessential technocrat.

IV

The main thrust of the engineer's thought was technocratic,[72] not professional. They believed that technology would transform Canada into an industrial utopia; that social problems were essentially technical ones requiring technical solutions. Although engineers had begun to develop a philosophy of professionalism, their close association with business arrested the growth of professional consciousness. For years they had argued whether engineering was a profession or a business. C.R. Young, the future Dean of the Faculty of Applied Science and Engineering, University of Toronto, in 1923, concluded that engineering was "part profession and part business".[73] This concept, in effect a dichotomy in the engineer's mind between idealism and pragmatism, overshadowed the engineer's thinking on professionalism.

In many respects, engineers thought like businessmen and regarded engineering as a business. They recognized that engineering depended on business and was ultimately justified by the profit motive: "Will it pay?".[74] An engineer's professional success, moreover, depended on his business success. "A successful engineer", asserted M.J. Butler, "is a good businessman".[75] He could not rely exclusively on technical knowledge and a common complaint was the engineer's lack of business sense.[76] "Engineering is business", the Canadian Engineer declared, "and there should be better business methods in engineering ..."[77]

Engineers were the embodiment of the Victorian creed of the entrepreneurial ideal, or success ethnic — the individualistic counterpart of the Idea of Progress.[78]

Like businessmen, they were fiercely competitive in their drive to attain financial success and social recognition and often used engineering as a stepping stone to more lucrative business careers in contracting. They upheld the required virtues of industry, hard work and perseverance and subscribed to the "self-help" philosophy of Samuel Smiles.[79] Their ideal was the self-made man who was not only professionally accomplished, but also wealthy and socially prominent. Engineers respected Fleming and Keefer, but Sir Casmir Gzowski (and later C.D. Howe) was their real hero.[80]

Although they were entrepreneurial by instinct, there were some fundamental differences between engineers and businessmen. Their basic objectives were not necessarily compatible and many engineers found it difficult to reconcile science with the profit motive. Moreover, engineers believed that they belonged to a much higher and more dignified calling. The engineer was not merely a businessman engaged in technical work, nor was he an integral part of business; he was a learned professional — the repository of esoteric scientific knowledge. For moral and practical professional reasons, engineers believed that they were not governed exclusively by business values and maintained that they had a special concern for the public interest.

Engineers were not willing to justify either profit or success by any means. They denounced dishonest and corrupt businessmen who, in their view, were preoccupied with the pursuit of profit. "The small cunning needed in some business", the Canadian Engineer observed with gentlemanly indignation, "has no place in the broader transactions of the engineer who is often disgusted with the methods of the so-called purely businessmen ..."[81] The pursuit of financial success, the engineers believed, often became an end in itself, justifying all acquisition no matter how sordid or corrupt. They were repelled by the competitive and deceptive aspects of business, thinking it, as one engineer put it, "undignified and unmanly".[82] It was important how wealth was accumulated; real success could not be measured without moral consideration.[83]

Engineers argued that they must have integrity. They were often placed in positions of trust, charged with expending public funds, or privy to secret trade information of value to a client's competitor.[84] As such, they were subject to insidious temptations by "shifty contractors and capitalists",[85] to compromise themselves for short term gain. Under these circumstances, "'the ideal engineer'", according to Charles T. Harvey, "must use the plumb line of integrity and the square of equity"[86] in his professional work and place the public interest ahead of personal interest. Otherwise, his usefulness would cease and his income would decline with his reputation.

The developing strains of professionalism — expertise, public service and professional trust — never coalesced and matured, in the engineer's mind, to form a coherent philosophy intellectually equal to other philosophies of professionalism. Engineers had remarkably little to say on the subject. They produced no philosophers or literature on engineering professionalism and their ideas were largely borrowed from other professions. As an abstract concept, professionalism was intellectually at variance with the engineer's quasi-business mentality and incompatible with his status as employee of large corporations. An engineer was too preoccupied with bureaucracy and the vicious competition of the marketplace, too divided in his thinking by business and science to develop an original philosophy suited to his condition.

As a partially formed, abstract and dimly perceived concept, suspended precariously between the opposing and sometimes contradictory notions of engineering as "part profession and part business", professionalism had an artificial, almost ubiquitous existence in the engineer's consciousness. Ultimately his professionalism was still-born. Rather than develop into a viable philosophy, it merged half formed, half digested, into the mainstream of the engineer's technocratic thought. Later, it was arbitrarily conscripted as a publicity device to legitimize the engineer's political initiative in obtaining restrictive licensing powers. To this extent, professionalism was a practical device lacking any intrinsic quality. As technocrats, engineers would masquerade in professional clothing in order to achieve political objectives.

V

The engineer's technocratic philosophy was at once naive and paradoxical; naive, because engineers had little influence in society; paradoxical, because, as Canada's foremost pragmatists, they developed an impractical and delusive philosophy. To this extent, it was also tragic. When the "pioneers of civilization and progress"[87] were confronted with the harsh reality of having little power or status in society, they became bewildered and embittered. The disparity between expectation and reality soon generated a fierce determination among engineers to raise their status and assume their rightful place in society.

Engineers were confident that they would realize their destiny. They believed that engineering would soon be recognized as the leading profession. At various times in history, they argued, different professions had occupied positions of leadership, but centuries before the advent of law, medicine, or even the priesthood, the engineer (although using a different name perhaps) practised his profession and uplifted humanity.[88] From its remarkable beginning with the "great engineer of the universe",[89] engineering, unlike other professions, had evolved and adapted to modern conditions and become, according to C.E.W. Dodwell, "the most important profession ..."[90] In future, as mankind increasingly looked to engineers, the profession would assume an ascendant position of leadership. The Canadian Engineer concluded that:

> The evolution of the modern world, of civilization itself, largely rests upon the engineer's shoulders. As his numbers increase and his talents are more and more exercised the future must invariably look to him in an increasing manner for the solution of its difficulties. To-day the engineer is a servant to many other interests; tomorrow — since only the fit survive — he may dominate and control those interests. The future largely belongs by right of conquest to the engineer.[91]

Engineers fully expected to inherit the earth. Through an almost divine process of natural selection, engineering had evolved far beyond other callings to meet the challenges of the modern industrial age. They had emerged as a new elite, the high priests of Progress, who alone possessed the esoteric knowledge essential for civilization's advancement. In every respect, the engineer had become "The Master Spirit of the Age".[92] Full of restless youthful vigour and aggressive self-confidence, engineers were determined to overcome reactionary and unprogressive forces, in order to build a new social order, a new steel and concrete utopia, founded on rationality and efficiency after their own image.

NOTES

[1] Quoted in Pierre Berton, The National Dream: The Great Railway, 1871-1881, (Toronto, 1970), p. 46.

[2] Some of Keefer's writings have been edited with an excellent introduction by H.V. Nelles, in Philosophy of Railroads and other Essays by T.C. Keefer, (Toronto, 1972). For a discussion of Kingsford, see: "Obituary — William Kingsford: A Tribute to His Memory", Transactions, Canadian Society of Civil Engineers [hereafter cited: TRANS CSCE], XIII, (1899) pp. 194-198; J.M. McConica, "William Kingsford and Whiggery", Canadian Historical Review, XL (June, 1959) pp. 108-120, and Carl Berger, The Writing of Canadian History: Aspects of English Canadian Historical Writing, 1900-1970, (Toronto, 1976) pp. 2-3.

[3] Although Canadian engineers drew inspiration from British engineering thought, they were more exposed to American ideas. They were avid readers of American engineering periodicals; heard addresses by prominent American engineers, such as Professor George F. Swain and came into contact with Americans in Canada, like C.D. Howe — Swain's student.

[4] Edit. "The Engineer's Opportunity", Canadian Engineer, 15 (14 Aug. 1908) pp. 567-568.

[5] St. George Boswell, "The Engineer of Today", Ibid. 3 (10 Feb. 1896) p. 257.

[6] Edit. "The Defeat of Reciprocity", Ibid. 21 (28 Sept. 1911) p. 371.

[7] C.M. Canniff, "Retiring President, Toronto Engineers' Club", Ibid. 20 (16 Feb. 1911) p. 327.

[8] Sandford Fleming, "Note on Electoral Representation and the Rectification of Parliament", in An Appeal to the Canadian Institute on the Rectification of Parliament (Toronto, 1892) p. 24.

[9] For an interesting and thoughtful analysis of the controversy over the meaning of the terms, "Science", "Applied Science" and "Technology", see: Maurice Adelman, "Toward a Sociology of Technology", Technology and Society, (Oct. 1974) pp. 123-127. Although mining engineers referred to themselves as "Technical men", civil engineers rarely used the term. Occasionally they referred to engineering as "applied science" and regarded their work as being more scientific than technical. The terms "applied science" and "engineering" were sometimes used interchangeably — even synonymously.

[10] For background on the Idea of Progress in Canada, see: L.S. Fallis Jr., "The Idea of Progress in the Province of Canada, 1841-1867" (unpublished Ph.D. dissertation, University of Michigan, 1966), esp. chap. 4.

[11] For an interesting analysis of the beneficial effects of the introduction of large scale machine production to Canadian industry, see: G.C. Cunningham, "Energy and Labour", Trans CSCE V (1891) pp. 235-261.

[12] University of Toronto Library, Canadian Society of Civil Engineers, Toronto Branch Papers [hereafter cited: Toronto Branch Papers] MS 102, Box #4, "Meeting at Engineers' Club", 5 Feb. 1917, p. 26.

[13] Edit. "Importance of Canada as an Engineering Field", Contract Record, 24, n. 38 (22 Sept. 1909) p. 31.

[14] Canniff, "Retiring President, Toronto Engineers' Club", p. 327.

[15] See, eg. "President's Address" (Henry T. Bovey) Trans CSCE XV (1901) p. 23.

[16] R.W. Leonard, "Presidential Address", Transactions, Engineering Institute of Canada, XXXIV (Jan. 1920) p. 5.

[17] Col. Leonard and others were concerned about the press exposure given to what they considered radical and misguided elements. In Leonard's view, "undue prominence in headlines and photographs is given to any radical or extreme utterance of even the most ignorant", Ibid. pp. 18-19.

[18] Engineers were equally critical of corrupt and irresponsible business practices, which they believed created the conditions for labour disputes. See eg. "President's Address" (W. McLea Walbank), Trans CSCE XXII (1908) p. 47.

[19] Leonard, "Presidential Address", pp. 5-14, passim: edit. "Strikes and Lockouts", Canadian Engineer, 15 (23 Oct. 1908) pp. 749-750.

[20] Edit. "The Grand Trunk Strike", Ibid. 19 (28 July 1910) p. 97.

[21] Leonard, "Presidential Address", p. 9. Col. Leonard also complained that society had been "unduly influenced by a few noisy and peculiar people who have been very badly educated ..." Ibid., p. 5.

[22] Edit. "Lenin on the Intellectuals and the Engineers", Canadian Mining Journal, XLI (6 Aug. 1920) p. 635.

[23] E.T. Clark, "The Engineering Institute of Canada", Transactions, University of Toronto Engineering Society, No. 36 (15 Apr. 1922) pp. 29-30.

[24] Although engineers liked to think that they were neutral in labour disputes, they lined up solidly with management and prided themselves on keeping public utilities running during municipal strikes. "Vancouver Branch" Journal of the Engineering Institute of Canada [hereafter cited: JOUR EIC] 11 (July, 1919) p. 520; "Winnipeg Engineers' Achievement", Ibid. (Aug. 1919) p. 562; edit. "Service to the Public", Canadian Engineer, 38 (12 Feb. 1920) p. 217.

[25] Engineers generally liked working men, but did not accept them as their equals. Their attitude was apt to be paternalistic. See: Eugene W. Stern's remarks to the engineering students, University of Toronto, "The Young Civil Engineer", Applied Science, New Ser. 2 (Jan. 1909) p. 91.

[26] Leonard, p. 14.

[27] Ibid.

[28] Engineers put great faith in the capacity of open discussion and arbitration to resolve labour disputes, provided, according to the Canadian Engineer, "the parties are not extremists, prompted entirely by selfish motives". The Canadian Engineer, for example, readily supported the Lemieux Act. See: edit. "The Arbitration of Labour Disputes", Canadian Engineer, 20 (4 May, 1911) p. 654.

[29] Leonard, p. 11.

[30] Edit. "The Engineers' Opportunity", Electrical News, 25 (1 May, 1916) p. 21.

[31] H.V. Nelles, "Introduction" to Philosophy of Railroads ... , p. XIX.

[32] Fleming, An Appeal to the Canadian Institute on the Rectification of Parliament, pp. 9-32; Sandford Fleming, Parliamentary vs Party Government, (Kingston, 1891); Carl Berger, The Sense of Power: Studies in the Ideas of Canadian Imperialism, 1867-1914, (Toronto, 1970) pp. 199-200.

[33] T.L. Crossley, "The Engineer in Politics" (abstract) Jour EIC, IV (May, 1921) p. 325.

[34] Sam G. Porter, "The Civil Engineer and his Relation to Society", Canadian Engineer, 26 (12 Feb. 1914) p. 233.

[35] Leonard, pp. 13-14; R.A. Ross, "Retiring President's Address", Jour EIC, IV (Mar. 1921) p. 198.

[36] Edit. "Municipal Engineers", Canadian Engineer, 31, (3 Aug. 1916) p. 99.

[37] Urbanization drew a growing number of engineers into city engineers' offices, where they soon came into conflict with elected officials. The young editor of the Canadian Engineer and Town Engineer for North Toronto, E.A. James, repeatedly drew attention to the abuse of city

engineers by city councils. On James, see: "Our Representation in the Senate", *Transactions*, University of Toronto Engineering Society, IV (Nov. 1910) p. 5; "E.A. James, B.A.Sc.", *Applied Science*, New Ser. No. 5 (March, 1910) p. 4.

[38] Edit. "The Engineers' Opportunity", p. 21.

[39] Edit. "The Municipal Engineer", p. 615; edit. "Engineers and City Government", *Ibid*. 29 (26 Apr. 1915) p. 311; edit. "Municipal Engineer and Employer", *Ibid*. 25 (21 Aug. 1913) p. 342.

[40] Edit. "Time for a Change in Municipal Government", *Ibid*. 28 (25 Mar. 1915) p. 391; "City Engineers and Civic Mismanagement", *Contract Record*, 25, n. 52 (27 Dec. 1911) pp. 38-39; *Unsigned letter to Editor*, *Ibid*. n. 51 (29 Dec. 1911) p. 41; At least one engineer, however, had reservations about Commission Government, see: Donald F. McLeod to Editor, *Ibid*. 28, n. 6 (11 Feb. 1914) p. 162.

[41] R.A. Ross, "Retiring President's Address", p. 199.

[42] For background, see: Paul Rutherford, "Tomorrow's Metropolis: The Urban Reform Movement in Canada", Canadian Historical Association, *Historical Papers*, (1971) pp. 204-224; "Introduction", *Saving the Canadian City: The First Phase 1880-1920*, edited with an introduction by Paul Rutherford, (Toronto and Buffalo, 1974) pp. IX-XXIII.

[43] Professor John C. Weaver has suggested that W. McLea Walbank, managing director of the Montreal Light, Heat and Power Company (and President of CSCE, 1907) endorsed municipal reform, largely because his utility company could no longer profitably afford bribes to municipal politicians. John C. Weaver, "Elitism and the Corporate Ideal: Businessmen and Boosters in Canadian Civic Reform, 1890-1920", in *Cities in the West: Papers of the Western Canada Urban History Conference — University of Winnipeg, October, 1974*, eds. A.R. McCormack and Ian MacPherson (Ottawa, 1975) p. 53.

[44] *Ibid*. pp. 48-73; Alan F.J. Artibise, *Winnipeg: A Social History of Urban Growth, 1874-1914*, (Montreal and

London, 1975) chap. 3; cf. Samuel P. Hays, "The Politics of Reform in Municipal Government in the Progressive Era", Pacific Northwest Quarterly, LV (Oct. 1964) pp. 157-169.

[45] Edit. "Engineers and City Government", p. 311; edit. "The Engineer and Public Service", Canadian Engineer, 30 (9 Nov. 1916) p. 389.

[46] Engineers pointed out, however, that medical progress was dependent on engineering for such things as fine surgical instruments and electrical appliances. The same argument was made in regard to Architects concerning the application of reinforced concrete in buildings. See: Walter J. Francis, "Engineering as a Profession", Applied Science, New Ser. VIII (Oct. 1913) p. 138; Walter J. Francis, "Engineering in Canada", Ibid. 3 (Mar. 1910) p. 217.

[47] Francis, "Engineering as a Profession", p. 138.

[48] Walter J. Francis, "Address — The Engineer: His Character, Training and Personality", Ibid. (Nov. 1909) pp. 20-21; J.L.G. Stuart, "Engineering Among Other Professions", Canadian Engineer, 26 (2 April, 1914) p. 543; "Cape Breton Branch" (Address by C.M. O'Dell) Jour EIC, IV (July 1921) p. 425.

[49] Francis, "Address — The Engineer: His Character, Training and Personality", p. 20.

[50] Edit. "The Lawyer and the Engineer", Canadian Engineer, 33 (16 Aug. 1917) p. 147; cf. Stuart, "Engineering Among Other Professions", p. 542.

[51] Edit. "The Lawyer and the Engineer", p. 147.

[52] Stuart, "Engineering Among Other Professions", pp. 542-543.

[53] Edit. "The Engineer and Public Affairs", Canadian Engineer 33 (27 Sept. 1917) p. 287.

[54] Edit. "Public Appreciation of the Engineer in Relation to his Work", Contract Record 29 (15 July 1915) p. 696.

[55] Edit. "The Claim of the Engiheer", Canadian Engineer 33 (12 Aug. 1917) p. 103; The Contract Record described the engineer as "The pioneer of industrial and economic progress", edit. "The Epic in Engineering", Contract Record, 32 (14 Aug. 1918) p. 631.

[56] Francis, "Engineering as a Profession", p. 137. Walter J. Francis, "The Engineer and the Public", Canadian Engineer, 26 (3 April, 1914) p. 671; edit. "The Engineer and Public Affairs", p. 287.

[57] Francis, "Engineering as a Profession", p. 138. cf. Walter J. Francis, "Engineering in Canada", p. 218.

[58] "President's Address" (Edward H. Keating), Trans CSCE, XVI (1902) pp. 27-28. Similar remarks were made by C.M. Canniff, "Retiring President, Toronto Engineers' Club", p. 326.

[59] Walter J. Francis, "The Engineer and the War", Canadian Engineer, 20 (6 April 1916) p. 417.

[60] See, eg. Frederick B. Goedike to Editor, Canadian Engineer, 34 (23 May 1918) p. 469; Toronto Branch Papers, Box #5, "Minutes of a Special Meeting of the Ottawa Branch" (John Murphy quoting a speech by W.F. Tye) pp. 3-4.

[61] In this context, W.F. Tye, President of the CSCE, 1912, remarked that the engineer was "the most important man in the world ..." Ibid., p. 4.

[62] Edit. "Reconstruction and the Engineer", Canadian Engineer, 33 (5 July 1917) p. 19.

[63] Edit. "Engineers and City Government", Ibid. 29 (26 April 1915) p. 311; edit. "The Engineer and Public Service", p. 389; edit. "Reconstruction and the Engineer", p. 19; edit. "Present Representation and the Engineer", Ibid. 33 (18 Oct. 1917) p. 349.

[64] Edit. "The Claim and the Engineer", p. 103. Engineers were proud of their administrative achieve-

ments. They directed attention to the growing number of engineers who were appointed as City Managers, proof of their ability to govern; edit. "The Engineer and Public Service", p. 309.

[65] "Fifth General Professional Meeting", (Col. Leonard) Jour EIC, 11 (Oct. 1919) p. 672.

[66] Professor Haultain believed that the engineer's major characteristic was "his persistent tendency towards honesty", Toronto Branch Papers, Box #4, "Meeting at Engineers' Club", 5 Feb. 1917, p. 11.

[67] Frederick B. Goedike to Editor, p. 469.

[68] Edit. "The Engineer's Opportunity", p. 21.

[69] Edit. "Conscription and the Engineer", p. 91.

[70] Edit. "Municipal Administration at Victoria, B.C.", Contract Record, 25, n. 44 (1 Nov. 1911) p. 35; see also edit. "Expert Advice", Canadian Engineer, 18 (16 June, 1910) p. 604.

[71] Thorstein Veblen, The Engineer and the Price System, (New York, Viking Press edition, 1947) pp. 71, 134. Veblen predicted that engineers would lead a social revolution. For an excellent analysis of this aspect of Veblen's thought, see Edwin Layton, "Veblen and the Engineers", American Quarterly, XIV (Spring, 1962) pp. 64-72.

[72] The engineer's technocratic ideas, however, differed sharply from those of the technocracy movement that emerged briefly during the early 1930's in the United States and Canada. Canadian engineers, for example, never developed a radical anti-capitalist critique, which advocated the abolition of the price system. In style and outlook, they were closer to the technocrats later popularized by James Burnham and John Kenneth Galbraith. For background on technocracy, see: William A. Akin, Technocracy and the American Dream: The Technocrat Movement, 1900-1941 (Berkley, 1977) and Henry Eisner Jr., The Technocrats: Prophets of Automation, (Syracuse, 1967).

[73] C.R. Young, "The Rise of the Engineer", Engineering Journal, VI (Nov. 1923) p. 511.

[74] Stuart, "Engineering Among Other Professions", p. 553.

[75] M.J. Butler, "Success in the Engineering Profession", Canadian Engineer, VIII (Feb. 1901) p. 224.

[76] Engineers maintained that modern practice drew them increasingly into business — contracts, finance, labour relations, business law — and finally into management. Although they possessed a virtual monopoly of technical expertise, they also recognized that their economic lives were controlled by businessmen. The cultivation of business skills, they argued, would make engineers more competitive in an environment dominated by businessmen. Accordingly, engineering students were often counselled on the necessity of acquiring business, as well as technical knowledge. See: R.A. Ross, "A Plea for the Business Training of the Engineer", Applied Science, New Ser. 2 (Dec. 1908) p. 57; edit. "The Technically Trained Man in Business", Canadian Engineer, 31 (3 Aug. 1916) p. 99; K.L. Aitken, "The Commercial Side of Engineering", Applied Science, New Ser. 1 (Feb. 1908) p. 190; E.T. Clark, "The Engineering Institute of Canada", pp. 30-31.

[77] Edit. "A Slack Time for Engineers", Canadian Engineer, 27 (22 Oct. 1914) p. 573.

[78] The 'success ethic', especially in a developing colonial society like Canada, was generalized into a national cult. Its ideal was the entrepreneur, the self-made man who by his own initiative, competed on an equal basis for wealth, power and recognition. For a discussion, see: Paul Rutherford, "A Portrait of Alienation in Victorian Canada: The Private Memoranda of P.S. Hamilton", Journal of Canadian Studies, 12 (June 1977) pp. 19-22. The success ethic was closely related to another Victorian ideal which W.L. Morton describes as "The Cult of Manliness"; or the "expression of the drive to prove oneself in an individualistic competitive society and to do so with some style and éclat". W.L. Morton, "Victorian Canada", in W.L. Morton (ed) The Shield of Achilles, (Toronto, 1968) p. 321. Engineers often liked to refer to engineering as the "manly profession". See, eg. R.E.W. Haggarty to Editor, Canadian Engineer, 17 (22 Oct. 1909) p. 468.

[79] Although Smiles' best known work was Self Help, (1859), engineers naturally preferred his Lives of the Engineers (1904) and Professor Peter Gillespie, University of Toronto, thought that a Canadian version of this book would be a great inspiration to engineering students. Toronto Branch Papers, Box #7, "Biographies of Engineers", pp. 1-2.

[80] Gzowski combined all the right qualities for success in the eyes of engineers — engineering achievement, financial success and social honours. For a biography, see: Ludwik Kos-Rabcewicz-Zubkowski and William Edward Greening, Sir Casmir Stanislaus Gzowski: A Biography (Toronto, 1959). For a brief popular study, see: Norman Sheffe, Casmir Gzowski (Toronto, 1975).

[81] Edit. "The Engineer and Public Affairs", p. 287. Also see: Toronto Branch Papers, Box #4, H. Wickstead to E. Oliver, 17 Feb. 1917, pp. 2-3.

[82] J.F.P. Tate to Editor, Canadian Engineer 39 (25 Nov. 1920) p. 561.

[83] St. George Boswell, "The Engineer Today", p. 258. Although engineers assumed that their outlook differed from businessmen in this regard, their reservations about success were not dissimilar to other philosophers of success who placed morality and character formation ahead of unrestrained acquisition. See: Allan Smith, "The Myth of the Self-Made Man in English Canada, 1850-1914", Canadian Historical Review LIX (June, 1978) pp. 203-204; Michael Bliss, A Living Profit: Studies in the Social History of Canadian Business, 1883-1911, (Toronto, 1974) p. 32; Timothy Travers, "Samuel Smiles and the Pursuit of Success in Victorian Britain", Canadian Historical Association, Historical Papers, (1971) pp. 154-165.

[84] Boswell, "The Engineer Today", pp. 258-259. Young engineers were advised to maintain a scrupulous distance from contractors with whom they were working, always refusing any gifts. "President's Address" (W.G.M. Thomson) Trans CSCE (1899) pp. 23-24.

[85] Charles T. Harvey, "The Conjunction of the Nineteenth Century from an Engineering Standpoint", Papers ... Engineering Society, School of Practical Science, Toronto, (1898-1899) p. 168.

[86] Ibid.

[87] J. Grant MacGregor to Editor, Canadian Engineer, XIV (4 Oct. 1907) pp. 367-368.

[88] "President's Address", (E.A. Keating), p. 20.

[89] Ibid., p. 28.

[90] C.E.W. Dodwell, "Engineers and Engineering", Jour EIC, III (March, 1920) p. 144.

[91] Edit. "The Survival of the Fittest", Ibid., 33 (8 Nov. 1917) p. 409. Social Darwinism did not have as great an impact on Canadian engineers as it did on American engineers. For an analysis of Social Darwinism and American engineers, see: Edwin T. Layton Jr., Revolt of the Engineers: Social Responsibility and the American Engineering Profession, (Cleveland, 1971) pp. 55-57.

[92] See: G. Baillairge, "The Engineer, The Master Spirit of the Age", Canadian Engineer VIII (3 July, 1900) p. 55.

Chapter II

"THE MONTREAL CLIQUE"

FORMATION OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS

Traditionally, Canadian engineers had advanced their careers by building individual reputations for technical achievement. But, by the late nineteenth and early twentieth centuries, as business, labour and professional groups were organizing collectively to protect and further their interests, engineers also began to organize themselves into a number of engineering societies. These organizations served a variety of technical, business and social needs. They reflected the engineers' values and aspirations and were the primary means through which engineers sought to fulfil their ideals and to realize their ambitions.

I

Prior to 1887, there were no professional engineering societies in Canada and Canadian engineers sometimes belonged to British or American societies, as corresponding members. Foreign engineering societies were generally unsuccessful in organizing Canadian branches. After 1887, two major

Canadian engineering societies emerged: the Canadian Mining Institute and the Canadian Society of Civil Engineers.

Organized, in 1898, from a loose federation of provincial mining societies,[1] originally created to monitor and to fight legislation adversely affecting the mining industry,[2] the Canadian Mining Institute (CMI)[3] claimed to represent an industry, not a profession. Its chief aim was to develop Canada's mineral resources, rather than to educate engineers.[4] Unlike the British Institute of Mining and Metallurgy, which confined itself to the advancement of mining and metallurgical science, the CMI organized on broader lines similar to the American Institute of Mining Engineers, in order to represent the various professional and business interests comprising the mining industry.[5] It formed a pragmatic and organic alliance of science and business, dedicated to a common industrial objective. Mining engineers valued their association with business and regarded it as an essential precondition to developing Canada's mineral resources.[6]

The CMI's membership was organized along industrial, rather than professional lines. It reflected a cross-section of the mining industry and included non-professionals — mine owners and managers — along with various professional groups, including mining engineers, geologists, metallurgists and chemists. This membership, in turn, was divided into two classes, members and associate members, which, in practice, served to distinguish those members who were either professionally or commercially engaged in mining. This classification, however, was only nominal, since non-professionals, though barred from holding office, enjoyed full voting and membership privileges and could be admitted to full membership at the discretion of the CMI's governing body.[7]

Although four-fifths of the membership were professional,[8] the CMI resisted attempts to form a purely professional society. Mining engineers were more entrepreneurial than civil engineers in outlook; they regarded the engineer primarily as an employee and engineering as an integral part of business. Professional advancement was pursued within the context of the mining industry. By facilitating the application of science to industry, while safeguarding the interests of the mining industry, particularly against "ill advised legislation",[9] mining engineers believed that they advanced their own interests and served the public.[10] The CMI was content to leave professional development to the Canadian Society of Civil Engineers.

Founded in 1887, the Canadian Society of Civil Engineers (CSCE)[11] was organized as a professional society. Unlike the CMI, the CSCE did not represent an industry, nor admit non-professionals to full membership. It was national in scope and claimed to represent all "civil",[12] or non-military engineers in Canada. Most of the professional development of Canadian engineers was promoted by the CSCE.

The CSCE was organized at a time when Canadian engineers had already laid the foundation of Canada's new transcontinental, urban-industrial economy. By 1887, the first phase of the great transportation works, culminating in the completion of the Canadian Pacific Railway, had been built and Canadian engineers were on the verge of constructing a new generation of engineering works, ranging through municipal, electrical, chemical and other industrial projects. Although the idea of forming an engineering society was discussed years before 1887,[13] it was not until the construction of the CPR that engineers began to seriously consider the idea. While the ranks of engineers swelled as the CPR neared completion in 1885, engineers thought that there were sufficient numbers of qualified professionals in Canada to form a viable national organization.

One of the major factors behind the formation of an engineering society was dissatisfaction arising from the legal advantage land surveyors enjoyed over civil engineers. Engineers could conduct canal and railway surveys, but they were prohibited from practising as surveyors, unless they fulfilled certain statutory requirements and passed an examination. By contrast, land surveyors, whether competent or not, could practise as civil engineers.[14] Some engineers believed that engineering should also be governed by statute and that they should enjoy the same privileges as land surveyors.[15] After consultation with C.E.W. Dodwell and other engineers in Toronto, during 1884 and 1885,[16] Alan Macdougall, a prominent Toronto consulting engineer, issued a circular, in January 1886, calling for the legal recognition of engineering and the formation of a national engineering society.[17] This initiative represented the organizational beginning of the CSCE and Macdougall became the leading organizer and promoter of the new society.[18]

In February 1886, Macdougall issued a second circular that led to a number of meetings, the most important of which was held in Montreal on 4 March, 1886. This meeting unanimously resolved to form a national engineering society to include all branches of engineering and to draft a preliminary constitution.[19] Local committees in Toronto, Ottawa and Montreal amended the draft constitution and elected representatives to a provincial committee, which was then given authority to complete the preliminary organizational work.[20]

Macdougall's plan for a national engineering society was highly controversial, since it advocated the comparatively radical measure, for that time, of securing legal recognition for engineers and closing the profession to unqualified practitioners. The new organization was perceived to be more than an educational body dedicated to advancing professional knowledge; it would have considerable legal power. Macdougall and his supporters not only wanted the recognition already obtained by surveyors, but much broader powers, remarkably similar to those delineated in a bill respecting civil engineers, presented to the Ontario Legislature, in 1881.[21] This bill, which had failed to become law, called for a full measure of professional self-government, with complete statutory authority to control and regulate all aspects of professional practice. Thus the new society, as Macdougall saw it, would become the means to acquire legal powers, with which to establish engineering on the same footing as law and medicine.

Macdougall and his supporters, however, were opposed by a group of conservative engineers — mostly older and more successful consultants, corporation managers and senior government engineers, such as T.C. Keefer and John Kennedy — who were generally sympathetic to raising the status of engineers, but disagreed with the means. Convinced that higher status could not be legislated, the conservatives believed that the standing of the engineering profession could only be improved through the efforts of individual engineers raising the standard of practice by acquiring professional knowledge. In their view, the primary function of an engineering society was to educate individual members. They saw the new organization primarily as a learned or educational society. To the conservatives, Macdougall and his supporters were proposing an unacceptable, collectivist remedy, bordering on trade unionism. The conservatives placed their faith in the success of the mother of all engineering societies, the Institution of Civil Engineers of Great Britain (ICE), which had rejected legal protection.[22] According to T.C. Keefer, the first president of the CSCE, the founders of the profession in Great Britain and the United States were born engineers and "sought only a free field and asked no favors".[23]

Although Macdougall was elected to the influential post of provisional secretary of the provisional committee,[24] his plan had already lost considerable ground, as the nascent organization grew and drew in more conservative engineers, especially from the Montreal area. The general sentiment was opposed to any plan to establish a closed corporation at that time and Macdougall's dream was submerged in a wash of conservative reaction. At the first general meeting, 24 February, 1887, called to ratify the work of the provisional committee, John Kennedy, a vice president, announced that any plans to acquire powers similar to the law society had been abandoned. "The profession", he declared, "was left an open one and the ranks of the profession were accessible to those in whom the public had confidence".[25] The Macdougall plan was overturned and Kennedy announced that the new society existed for the "interchange of ideas among members of the profession ..."[26]

II

The conservatives believed that the primary function of an engineering society was educational. They viewed the CSCE as a learned society, similar to the ICE,[27] and held that the CSCE's principal object was, in the words of the new constitution, "to facilitate the acquirement and interchange of professional knowledge among its members and to encourage original investigation ..."[28] Until the First World War, the conservatives stubbornly adhered to this objective and steadfastly refused to allow the new society to serve business, or to promote the careers of individual members.

The conservatives argued that the CSCE, unlike the CMI, represented a profession, not an industry. The diversity of engineering specialties — civil, mechanical, electrical and mining — precluded any organizational attachment to a particular industry. Although engineers appreciated business support,[29] in order to preserve their professional integrity, they jealously guarded their independence. Whereas mining engineers valued their association with business, civil engineers often viewed business with suspicion, even as a potential threat to their autonomy. In the late 1880's the greatest danger to an engineer's professional independence came from business, not government. Emerging corporations, such as the great railway, bridge and ironwork companies, exerted enormous bureaucratic pressure on engineers to subordinate science to business. Since the conservatives regarded engineering societies as the guardians of the engineer's professionalism, it followed that an engineering society must be autonomous, free of interference by non-professionals, to ensure full colleagual control over professional development. The use of an engineering society by unscrupulous businessmen for selfish commercial purposes, the conservatives asserted, might easily subvert a society's professional priorities and lower the status of individual members. "[I]t is absolutely necessary to have it understood", stated one engineer in 1887, "that we do not intend to sacrifice our independence and are determined to keep our society a professional one ..."[30]

The conservatives also maintained that the CSCE was not constituted to further members' careers, nor to serve their business and social needs; that was the purpose of the private engineers' clubs.[31] It was inappropriate that the Society should intervene on behalf of individual members to protect reputation or livelihood. The conservatives simply regarded interference between an engineer and his employer as a form of trade unionism. Moreover, the conservatives held that it was contrary to the Society's aim to comment on, or attempt to influence public opinion. As an educational society, they felt that the CSCE should serve the public indirectly by improving Canadian engineering. To this end, the conservatives planned to raise the standard of professional practice through the interchange of professional knowledge and by accepting only highly qualified engineers as CSCE members. This approach was outlined by Phelps Johnson in his President's Address:

> The basic purpose of the society can best be achieved by having enrolled in its membership a large proportion of the able and active engineers of the country, by the interchange of thought and of experience at its meetings and particularly by the reading, discussion and circulation of papers on important and interesting works of investigation.[32]

Papers would be presented and published. Special research committees, chaired by prominent engineers, would study important practical engineering problems and high admission standards would be imposed. The conservatives assumed that these measures would not only raise the standard of professional practice, but, as a consequence, raise the engineer's status.

III

High admission standards were central to the conservatives' plan to raise the standard of professional practice. They were the principal means of creating an elite organization of highly qualified professionals, ranking with and accepted by the older and more prestigious engineering societies, such as the ICE and the American Society of Civil Engineers (ASCE). Prior to a time when civil engineering qualifications were determined by statute, the conservatives hoped that CSCE membership would distinguish professionals from non-professionals (particularly tradesmen and practical men), as well as certify an engineer's professional competence without government regulation.

Both the CMI and the CSCE admitted businessmen, or "Associates",[33] to membership, but there was a fundamental difference. Whereas the CMI permitted Associates to vote and actively encouraged their participation in Institute affairs, the CSCE maintained a rigidly graded hierarchy of membership which excluded Associates from full membership.[34] They could neither vote nor hold office. The CSCE was entirely dominated by professionals and offered little of interest to businessmen. The financier and engineer, H.S. Holt,[35] for example, vigorously protested being classified as an Associate and insisted on, and later qualified for, full member status.[36] Significantly, by 1921, the CSCE had only a dozen Associates — about one-third of one percent of the total membership.[37]

The CSCE restricted full membership to professionally qualified engineers; that is, men[38] who could design and direct engineering works and had at least ten years experience, five in responsible charge of work. According to the By-Laws:

> Every candidate for election as Member must be at least thirty years of age, and must have been engaged in some branch of engineering for at least ten years, which period may include apprenticeship, or pupilage in a qualified Engineer's Office, or a term of instruction in some school of Engineering recognized by the Council. The term of ten years will be reduced to eight years in the case of any candidate who has graduated with honours in his engineering course. In every case the candidate must have had responsible charge of work for at least five years and this not merely as a skilled workman, but as an engineer qualified to design and direct Engineering works.[39]

These requirements constituted the CSCE's definition of a 'Professional' engineer and effectively barred tradesmen and other non-professionals from membership.

At the heart of the CSCE's admission requirements was the provision that an engineer must have had "responsible charge of work".[40] The requirement that an engineer be "qualified to design and direct Engineering works" merely distinguished the engineer from the skilled workman; it did not make him a professional. Professional engineering went beyond design and construction to include managerial functions. The engineer thus had to combine executive ability with technical knowledge; but he was more than just a technically knowledgeable business manager. He had to be responsible for the design and construction of engineering works. Responsibility implied an element of trust which, in some respects, was comparable to the fiduciary relationship between a client and a member of the older consultative professions, particularly law. Engineers were frequently placed in positions of trust and charged with the expenditure of large amounts of public or corporate funds.[41] Employers had to be assured that an engineer was not only technically competent, but also responsible enough to assume charge of a complex project. Thus the CSCE insisted that its members be mature and experienced.

From the beginning the CSCE had very high educational requirements, which also served as a convenient method of excluding non-professionals. It demanded a university level engineering education, or its equivalent. After 1912, a Board of Examiners was established[42] to examine candidates who were not graduates of a recognized school of engineering, in order to determine who was qualified to design and direct engineering work.[43]

Of equal and, in some respects, greater importance, were the unwritten provisions regarding the character and non-technical requirements for student members. They first had to be high school graduates pursuing a recognized course of study in engineering.[44] Students were also expected to have a good general education, in order to think and to express themselves clearly and to interact with educated and intelligent people.[45] Voicing a commonly held view that the educational and cultural attainment of individual members would, in part, reflect the Society's social and professional standing, some engineers warned that "the admission of students who [did] not possess a proper degree of culture would lower the tone of the Society ..."[46]

Thus, the conservatives saw the engineer not just as a skilled workman possessing esoteric technical knowledge, but as a well rounded and cultivated individual, a gentleman, competent to assume responsibility and to win the acceptance of colleagues and associates, as well as the respect of subordinates. The engineer, stated John Galbraith, Dean, Faculty of Applied Science and Engineering, University of Toronto, and President, CSCE, "must be a many-sided man thoroughly acquainted with his own work and able to co-operate with all sorts and conditions of men ..."[47]

The CSCE's exclusiveness was further enhanced by a strict admission procedure, which placed enormous discretionary power in the hands of its Council.[48] Prior to 1918, all candidates for admission were elected by letter ballot submitted to the general membership. When the Society grew larger, the Council elected all members. Following practice established by the ICE and the ASCE, it first issued a "preliminary list" containing a concise summary of the applicant's qualifications for the membership's careful scrutiny, before making its decision.[49] Any three Councillors could vote to reject a candidate[50] and Council could effectively veto any 'unacceptable' applications by not approving or classifying an application.[51] As a further safeguard, all applications had to be accompanied by the personal recommendation of no less than five members.

The CSCE's high admission standards, however, did not restrict the practice of engineering to qualified professionals. Because the Society was a self-constituted, private and voluntary organization, its admission standards had no standing in law. They were arbitrary and subjective and were ultimately predicated on the assumption, perhaps the expectation, that CSCE membership, like ICE membership in Great Britain, would be recognized by all employers as the only reliable guarantee of professional competence. Unlike ICE membership in Great Britain, CSCE membership was not recognized by most corporate employers. Anyone in Canada could call himself an engineer and practise engineering; it was not necessary to belong to the CSCE. High admission standards could not protect members from competition.

Apart from tightening admission requirements and redoubling efforts to bring the majority of qualified professionals voluntarily into the CSCE, the only effective and logical alternative to restricting practice further was to make the CSCE's admission requirements mandatory. This, in turn, would require legislation to compel engineers to belong to the CSCE in order to practise. Although the CSCE never became a licensing authority (except in Quebec), engineering was eventually restricted by law to qualified professionals. The admission requirements, adopted by government, were originally defined by the CSCE, acting independently as a private body. Although the conservatives had originally rejected Macdougall's plan for a closed profession, by imposing high admission standards, they had, nevertheless, created the conditions that would lead to licensing. Thus, in many respects, their attempt to exclude non-professionals from membership, with high admission standards, represented the first major step towards restricting competition and monopolizing engineering practice in Canada.

IV

To preserve the CSCE as a learned society and to maintain high admission standards, the conservatives installed a form of society government that enabled them to effectively control the CSCE until the First World War. Although the society's new constitution prescribed a democratic system of government similar to other major engineering societies in Great Britain and, especially, the United

States, in practice, the CSCE was an oligarchy governed by a coterie of prominent conservative Montreal engineers. In style and substance, the CSCE's government resembled corporate and bureaucratic structures and reflected conservative notions of order, hierarchy and deference to authority.

The CSCE's governing body was the Council. It was elected at the Annual Meeting and consisted of a President, three Vice Presidents, Secretary, Treasurer, the last three surviving Past-Presidents or Honorary Councillors (non-elected) and twenty Councillors. According to the Society's constitution, the Council had "general supervision of the affairs of the Society",[52] including the approval and classification of applications for membership and the appointment of the Secretary, Treasurer and the various standing and special committees.

CSCE Presidents were essentially figureheads. They were men of great prestige and their election to the Society's highest office was usually regarded as the ultimate tribute to an outstanding professional career: but, while Presidents could exercise short term influence, they had no prescribed powers beyond chairing meetings.[53] Their duties were largely ceremonial. Ironically, they appeared to have exercised more power collectively with their fellow Past Presidents and as members of the powerful Nominating Committee — after their tenure as Presidents.

The Secretary was the CSCE's most powerful officer.[54] Charged with the general management of the Society, the Secretary, rather than the President, was the real executive head. As a non-elected yet full voting Council member the Secretary combined all the covert authority and executive initiative of a deputy minister and corporate general manager. Enjoying an extended tenure of office, while possessing the most comprehensive knowledge of the CSCE's internal operation, he provided continuity of management and wielded power and influence over the CSCE quite out of proportion to his single vote on Council. Moreover, as the general editor of the Society's publications and the head of a network of contacts and loyalties built up over years of service, the Secretary also enjoyed special influence with the general membership, independent of Council.

The CSCE was blessed in having as its Secretaries remarkably able and dedicated men whose personalities influenced the development of the Society. The first Secretary, Dr. H.T. Bovey, Dean of the Faculty of Applied Science, McGill University, together with Alan Macdougall, helped to organize the CSCE and, throughout his five years in office, this cultivated and articulate Englishman imparted a sense of integrity and dignified professionalism to the new Society. In 1891, Bovey was succeeded by Professor C.H. McLeod.

Undoubtedly, the CSCE's most important and powerful Secretary was C.H. "Bunty" McLeod, Vice-Dean of the Faculty of Applied Science, McGill.[55] In his twenty-five years as Secretary, until his retirement and death in 1917, Professor McLeod presided over the most critical phase of the CSCE's development and played a leading part in the Society's management.[56] McLeod was strong-minded and did not hesitate to resort to unorthodox means to attain what he regarded as worthy ends.[57] To an admirer, McLeod possessed great executive ability and had a keen understanding of men.[58]

The Secretary's position was part-time and paid a modest honorarium.[59] For years, as the CSCE expanded, McLeod laboured unselfishly under an increasingly heavy and crippling burden of work, until death overtook him in his office at McGill, in his sixty-sixth year. Thereafter, McLeod's annual recommendation for a full time Secretary[60] was realized with the appointment, in 1917, of the energetic and efficient Fraser S. Keith. While Keith became the CSCE's first well paid, full time Secretary,[61] unlike his powerful predecessor, the new Secretary was not accorded full voting rights in Council.

Originally, the CSCE elected its officers by a simple majority vote at its Annual Meeting; but, as the Society grew larger, it was forced to abandon this system and to create a Nominating Committee, an innovation borrowed from the ASCE.[62] Officially, the new procedure was intended to secure more equitable provincial representation on Council.[63] In practice, however, the Nominating Committee effectively transferred the control of the Society's electoral machinery from the general membership to a small group of prominent Montreal engineers.

It was extremely difficult for Committee members to recommend a slate of thirty-one suitable candidates from a large and diverse membership scattered across the Dominion.[64] This was especially true of younger engineers, resident outside Montreal, who were less familiar with available candidates. For Montrealers, however, the task was simpler. Since Montreal was the headquarters of Canada's largest railway and engineering companies, the city had the largest pool of engineers, with proven administrative and executive experience from which to nominate worthy and "acceptable" candidates.

At the same time, Montreal had other important advantages. Since it had the largest number of members, 367 in 1916, for example, as opposed to 168 in Ottawa, the next largest centre,[65] it had disproportionate representation in the election of the Nominating Committee and Councillors. The eight elected members of the Nominating Committee (six from Ontario and Quebec) nominated twenty-five Councillor candidates, ten of whom, according to the By-Laws, were to be Montreal residents and the remainder from anywhere in Canada, including, presumably, Montreal.[66] Moreover, the Montreal members of the Nominating Committee, combined with the non-elected Committee members — the three Past Presidents who usually supported the Montreal establishment — easily constituted the simple majority necessary to nominate the Society's officers. As the Nominating Committee sometimes nominated only the exact number of candidates,[67] it could virtually elect the Council, because the general membership was given no alternative to the official slate.

As a result, the Nominating Committee annually selected what appeared, at least to outsiders, as a disproportionate number of Montrealers[68] who seemed to monopolize office. Analysing Council membership (excluding Vice Presidents and Presidents) in the ten years preceding 1913, one critic observed that "eight members have served four years on the Council and one for six years. Ten have served three years and several have been on for two years ..."[69] Moreover, because the duties of Councillors demanded a substantial personal outlay of time and money,[70] in an era of uncertain and irregular employment even for experienced engineers, only older and more established engineers could stand for nomination, thus effectively excluding younger engineers.

The selection of the Society's senior officers was even less democratic. In practice, the presidential and vice-presidential candidates were chosen by the Honorary Councillors on the Nominating Committee. As conservative apologists argued, the Past Presidents were more familiar with the character and ability of other members of Council and therefore could best judge who was competent to occupy the Society's highest responsible positions.[71] Moreover, because it was customary each year for the Past Presidents to nominate only one Presidential candidate from among the three Vice Presidents,[72] a kind of self-perpetuating presidential oligarchy was established, which, in effect, deprived the general membership of democratically choosing its senior officers.

Although the CSCE's constitution provided for a separate opposition ballot, signed by any ten and, later, twelve voting members,[73] attempts to upset the official slate were rare and unsuccessful. Opposition ballots never challenged the authority of the Nominating Committee. They appeared to carry a stigma of illegitimacy,[74] as a result of being conspicuously labelled and presented to the membership separately.[75] In 1892, when E.P. Hannaford contested John Kennedy's presidential nomination, for example, Kennedy's supporters argued that he had "a prescriptive right" to the Presidency, because he was the senior Vice President and the unanimous choice of the Nominating Committee. Since a contest for the Presidency was unknown in the ICE and infrequent in the

ASCE, Kennedy's supporters successfully characterized the whole affair as being undignified and injurious to the Society. Hannaford was easily defeated.[76]

To outsiders, the concentration of power among a few prominent members in Montreal appeared to be cliquish and, according to one report, the belief arose that the CSCE was "run for the glorification of a few prominent engineers"[77] by a "McGill Clique", or, as it later became known, a "Montreal Clique".[78] This belief not only stemmed from the fact that many of the Society's officers were prominent Montrealers who appeared to dominate Council affairs, but also because of the important organizational and administrative role McGill engineers played during the early history of the CSCE. For example, the important office of the Secretary was occupied by McGill engineers. With the exception of Fraser S. Keith, a McGill electrical engineering graduate, three out of four Secretaries, between 1887 and 1925 held teaching positions in the Faculty of Applied Science.[79]

The "Montreal Clique" was not an organized or structured group; nor was it composed exclusively of Montrealers. It took form mainly in the minds of critics and outsiders as a kind of informal grouping of prominent Montreal oriented engineers who controlled Society affairs and shared similar conservative beliefs about the nature of Canadian engineering professionalism. To this extent, the Montreal Clique was the successor group to the conservatives headed by Keefer and Kennedy.

To its severest critics, however, the Montreal Clique was associated with the Society's undemocratic nature. "The Society [was] founded on democratic principles", lamented one of the oldest members of the CSCE, "but practically it is governed by a handful of men in Montreal ..."[80] The power and influence of non-elected Councillors were particularly resented. For instance, the Honorary Councillors, combined with the Secretary and Treasurer — two other non-elected yet voting members — constituted a quorum in Council which, potentially, could manage the Society's day to day affairs if several elected Councillors did not live in Montreal. In 1897, one group of members charged that

> The Council contains six past Presidents five of whom are practically resident at headquarters and accordingly owing to the small number of elected councillors who are also resident at headquarters, it is quite possible for this large non-elective vote to control the action of Council.[81]

While these critics had, perhaps, overstated their case, towards the First World War there was a growing and widespread feeling that the Montreal Clique had lost touch with the membership and was serving its own interests.

The Montreal Clique's control over the CSCE affairs was also reinforced by a tendency towards secrecy within Council. Council decided what information about its proceedings was disclosed to the general membership. Although most Council business concerned routine administrative matters, it also discussed private and confidential matters such as the admission and classification of members. As a rule, Council generally tended to keep all of its proceedings secret and released only a brief synopsis of its affairs in the Annual Report.[82] While some members complained that Council was not taking the membership sufficiently into its confidence by disclosing more information,[83] most members were apathetic and generally accepted the situation, believing that nothing untoward happened in Council.

Although the Montreal Clique was often called "arrogant" and sometimes "autocratic", it was able to control the CSCE, because it had the tacit, albeit grudging support of the general membership. Most members tended to accept authority and deferred to their professional betters. They viewed the Montreal Clique essentially as honourable men and believed that the early success of the Society was due to their hard work and dedication. The Montrealers formed the backbone of the Society; laid strong foundations and kept the Society going in times of trouble. Moreover, the prestige of the Clique's more prominent members gave the CSCE professional standing.[84] Even the harshest critics reluctantly conceded that the Clique managed the Society's affairs competently. To H.E.T. Haultain, the Montreal Clique was "an autocracy of leadership rather than of domination. . . ."[85] However, neither these sentiments, nor the Clique, were to last beyond the First World War. As the demand for reform grew, the Clique's authority was eclipsed and its power diffused more equitably throughout the CSCE.

V

The CSCE was the institutional expression of the Montreal Clique's pre-industrial professional values.[86] Modelled after the ICE, it combined the advantages of a learned society and a gentleman's club. Engineers, such as Keefer and Kennedy, were essentially gentlemen professionals. They were professionally and financially secure and the CSCE's principal value was prestige enhancement. Unfortunately, the CSCE offered little for the mass of ordinary members led by Alan Macdougall.

These young, university educated, middle-class members were bureaucratically oriented and did not entirely share the Montreal Clique's professional values. As junior salaried employees of large public and private corporations, their immediate concerns were employment and salaries. The CSCE, as an educational body, was institutionally at variance with their needs. Moreover, although the CSCE, like the ASCE, was not controlled by business,[87] it nevertheless indirectly served business. Dominated by the Montreal Clique (the majority of whom were corporate managers and high ranking civil servants), the CSCE discouraged members from collectively pursuing their natural interest as employees. For example, on the pretext of being a learned society, the CSCE could remain strictly neutral in all labour disputes involving engineers, as well as stand aloof from public works controversies which could embarrass governments.

While the CSCE would continue to serve the interests of the Montreal Clique, it would have progressively less appeal for most other members. As a learned society, it would not promote their economic interests. Confronted by fierce competition for jobs, these engineers would be less concerned with the interchange of professional knowledge and more preoccupied with their immediate economic survival. Although the Montreal Clique had firmly established the CSCE as a learned society, they had not suppressed protectionist sentiments. In the 1890's, younger engineers, led by Macdougall, would mount an insurrection against the Montreal Clique and demand licensing laws to close the profession.

NOTES

[1] The Mining Society of Nova Scotia remained independent until its affiliation with the Canadian Mining Institute in 1919. Although it admitted businessmen, its members did not claim to represent an industry and aspired to be a professional society. Edit. "Canadian Mining Societies", Canadian Mining Journal, XXXV (1 Nov. 1914) p. 894; F.W. Gray to Editor, Ibid., XXXIX (1 Dec. 1918) p. 401.

[2] H. Mortimer-Lamb, "The Institute in its Relationship to Government", Bulletin of the Canadian Institute of Mining and Metallurgy, No. 107 (March, 1921) p. 231.

[3] No scholarly history of the CMI has been written. A few narrative accounts, however, have been written by CMI members: H. Mortimer-Lamb, "Some Notes on the History and Recent Development of the Canadian Mining Institute", Canadian Mining Journal XXX (1 Oct. 1909) pp. 585, 588; John E. Hardman, "Some Reminiscences of the Early Days of the Institute", Canadian Mining Institute Bulletin, No. 83 (March, 1919) pp. 297-303; and W.M. Goodwin, "The Institute — 1898-1948", Transactions of the Canadian Mining Institute and of the Mining Society of Nova Scotia, LI (1948) pp. 11-13.

[4] University of Toronto Library, Canadian Society of Civil Engineers, Toronto Branch Papers (hereafter cited: Toronto Branch Papers) MS 102, Box #4, "Meeting at the Engineers' Club" (Minutes) p. 25; Edit. "Engineers and the Mining Industry", Canadian Mining Journal, XXXIX, (1 Nov. 1918) p. 363; Edit. "The Canadian Mining Institute", Ibid., (1 Dec. 1918) p. 399.

[5] The American Institute of Mining Engineers (AIME) was remarkably similar to the CMI. It admitted non-professionals: "all persons practically engaged in mining, metallurgy, or metallurgical engineering", [quoted in John W. Lieb Jr., "The Organization and Administration of National Engineering Societies", Transactions of the American Institute of Electrical Engineers, XXIV (Jan.-Dec. 1905) p. 287], the CMI considered itself a "brother-in-arms" to the AIME. Hardman, "Some Reminiscences of the Early Days of the Institute", p. 303.

[6] Edit. "Canadian Mining Institute", p. 400. The Canadian Electrical Association, founded 1891, was another trade society, organized along industrial, rather than professional lines. Its purpose was "to foster and encourage the science of electricity and promote the interests of those engaged in any electrical enterprise". Its members were connected mainly with electrical utilities and electrical manufacturing. "The Founding of the C.E.A.", Electrical News and Engineering, 49 (15 June 1940) pp. 64-67; "The First Quarter Century", Ibid., pp. 68-80, 87-88.

[7] The Council of the CMI was empowered to admit anyone who it deemed "eligible through connection with mining affairs". Bylaws of the Canadian Mining Institute (originally adopted March 1905), printed in Quarterly Bulletin of the Canadian Mining Institute, No. 11 (June, 1910) p. 217.

[8] Edit. "Canadian Mining Institute", p. 413. Controversy over the status of the CMI was aroused by Professor H.E.T. Haultain (a prominent member of both the CMI and the Canadian Society of Civil Engineers), who remarked that the CMI was a "trade association" and by a Memorandum to Prime Minister Borden, from an unofficial committee of the Canadian Society of Civil Engineers, which disparaged the size of the CMI's professional membership. See edit. "The Canadian Mining Institute", Canadian Engineer 35 (7 Nov. 1918) p. 417; Edit. "The Canadian Mining Institute", Ibid., 36 (23 Jan. 1919) p. 173; Memorandum Regarding National Industrial Development in Canada, Submitted to the Right Honourable Sir Robert Borden Prime Minister of Canada, May 1916, by certain members of the Canadian Society of Civil Engineers and Sir Charles Ross Bart; Engineering Institute of Canada Scrap Book [hereafter cited EIC Scrap Book] No. 6, R.A. Ross to R.L. Borden, 30 May, 1917; Edit. "Misrepresenting Canadian Mining Societies", Canadian Mining Journal, XXXVIII (1 May 1917) p. 190; Edit. "That Memorandum of the Civil Engineers", Ibid. (15 May, 1917) p. 207; R.W. Leonard to Editor, Ibid. (1 June 1917) p. 228; John E. Hardman to Editor, Canadian Mining Institute Bulletin, No. 80 (Dec. 1918) pp. 1012-1013.

[9] Mortimer-Lamb, "Some Notes on the History ...", p. 585. The CMI claimed to have successfully prevented the imposition of an export tax on Sudbury Copper-Nickel, reduced the royalty on Yukon gold, in addition to similar reforms in Quebec. It also claimed to have been instrumental in the establishment of a separate Federal Department of Mines and to have virtually nominated its first minister, ibid., p. 586; Goodwin "The Institute —

1898-1948", p. 11; Mortimer-Lamb, "The Institute in its Relationship to Government", p. 232.

[10] Edit. "The Engineer and the Canadian Mining Institute", Canadian Mining Journal XL (29 Jan. 1919) pp. 49-50.

[11] In 1918, the CSCE changed its name to the Engineering Institute of Canada (EIC). Only a few brief narrative histories of the CSCE exist. See eg. "The Story of the Engineering Institute of Canada, 1887-1937", Engineering Journal, XX (June, 1937) pp. 275-282; "The Story of the Engineering Institute of Canada, 1887-1962", Ibid. (June 1962) pp. 74-78; W.G. Richardson, "The Birth of the EIC", Ibid., 59 (Jan./Feb. 1976) pp. 54-57.

[12] In 1887, most of the members of the CSCE were engaged in railway, contracting, or municipal work. Mechanical, electrical, chemical and mining engineering were in their infancy and the founders could not have foreseen the later degree of specialization. Nevertheless, they were far-sighted enough to have provided for their inclusion in the Society: "The Story of the Engineering Institute of Canada, 1887-1937", Ibid., pp. 277-278; Edit. "Broadening the Scope of the Canadian Society of Civil Engineers", Contract Record 31 (28 Mar. 1917) p. 274; Edit. "An Engineering Society to Include All Canada's Technical Men", Electrical News 26 (15 Feb. 1917) p. 19.

[13] The formation of the Canadian Institute in 1[illegible]49, by Sir Sanford Fleming and others, represented one of the earliest attempts to organize engineers. This Society, however, also included land surveyors and architects and, after a time, concentrated most of its attention on pure, rather than applied science. See, W. Stewart Wallace, "A Sketch of the History of the Royal Canadian Institute, 1849-1949", in W. Stewart Wallace (ed.) The Royal Canadian Institute Centennial Volume 1849-1949, (Toronto, 1949) p. 127. In 1860, an organization called "The Association of Provincial Land Surveyors and Institute of Civil Engineers" was incorporated in the United Province of Canada, but very little is known of this organization. See, "Engineering Organization in Canada", Engineer CLXIV (30 July 1937) p. 130.

[14] "President's Address" (T.C. Keefer) Transactions, Canadian Society of Civil Engineers, [hereafter

cited: Trans CSCE] II (1888) p. 10. In Ontario, most city engineers were forced to obtain licences to practise as Land Surveyors, in order to carry out their responsibilities. See: Alan Macdougall's remarks: "Proceedings of the Toronto Summer Meeting", Ibid. X (1896) p. 98.

[15] Ibid.

[16] "Personals: enthusiastic champion of Profession" Journal of the Engineering Institute of Canada [hereafter cited: Jour EIC] 111 (July, 1920) p. 370. Dodwell later headed the committee which, in 1919, drafted a model Act that formed the basis of provincial legislation, establishing provincial licensing associations. He is somewhat inaccurately referred to as the "father of engineering legislation in Canada", cf "The Story of the Engineering Institute of Canada, 1887-1937" p. 278.

[17] EIC Scrap Book, No. 1, Alan Macdougall, "Circular", 8 Jan. 1886. An earlier attempt to start a society was made by E.W. Plunkett, in 1880, when he issued a circular under the pseudonym XY. Plunkett advocated modelling a society after the Institution of Civil Engineers, but with certain modifications to meet Canadian needs. This initiative, however, did not meet with much success. See: Ibid. XY "Circular", 15 May, 1880.

[18] Macdougall personally financed the early organization expenses and won praise and recognition from his colleagues. Ibid., Macdougall to John Kennedy, 16 Feb. 1886; Minutes of the First Annual Meeting, CSCE, 24 Feb. 1887, p. 10.

[19] Council Minutes, Minutes of Meeting of Provisional Committee, 4 Mar. 1886, enclosure, n.p.

[20] Ibid. 11 Nov. 1886, Minutes First Annual Meeting, 24 Feb. 1887, pp. 3-4, "President's Address" (Keefer) pp. 13-14.

[21] In February, 1881, An Act Respecting Civil Engineers, which proposed to regulate the qualifications of engineers through registration, was introduced as a private measure into the Ontario Legislature. It divided engineering into branches and engineers into various grades. A board of engineers, appointed by the Crown

from a list of fourteen prominent engineers (cited apparently without the knowledge or consent of the engineers named), would be given broad powers to regulate all aspects of professional practice. This bill, however, received little support and was thrown out upon second reading. See, Ontario Archives (PAO) RG 8 1-7-H, An Act Respecting Civil Engineers.

[22] In this respect, the views of the conservatives were more in accord with Plunkett's intentions, supra, n. 19.

[23] Keefer, "President's Address", p. 11.

[24] Minutes of the Meeting of the Provisional Committee, 9 Dec. 1886, n.p.

[25] EIC Scrap Book, No. 1, quoted in Montreal Gazette, 25 Feb. 1887, clipping.

[26] Ibid.

[27] The majority of the CSCE's charter members (nineteen) were members of the ICE. C.H. McLeod, "How Canadian Engineers Organize", Canadian Engineer 32 (19 Apr. 1917) p. 341.

[28] Charter, By Laws and List of Members of the Canadian Society of Civil Engineers, (Montreal, 1905) [hereafter cited: By-Laws ... (1905)] s. 3.

[29] It was common practice for railway companies to give reduced, or free passage to its employees to attend CSCE meetings. Other companies frequently entertained visiting engineers when they inspected their engineering works. See Minutes Ordinary Meeting, 3 Jan. 1889, p. 164; Council Minutes, 3 Feb. 1891, p. 57; "Report of the Annual Meeting", TRANS. CSCE XXIII, (1909) p. 85; Ibid. XXV (1911) p. 182.

[30] E.I.C. Papers, P.K. Hyndman to H.T. Bovey, 18 Apr. 1887.

[31] The Engineer's Clubs were social clubs, which provided an informal setting for members to meet and entertain clients, business and professional associates. Their membership included prominent CSCE members, technically trained men, non-professionals and businessmen. Among the oldest and most successful clubs were the Toronto and Montreal Engineers' Clubs, incorporated in 1902 and 1903 respectively. The Toronto Engineers' Club, reorganized in 1911 in order to broaden its membership and social activities, was unique, because it served as the headquarters of all important engineering organizations in the city. "The Engineers' Club of Toronto", Contract Record 31 (7 Feb. 1917) p. 118; "The Engineers' Club of Montreal", Ibid. 26 (12 June, 1912) p. 54; C.R. Young, "The Engineers' Club of Toronto", Applied Science, New Ser. IV (3 Jan. 1911) pp. 107-110; "Engineers' Club, Toronto: A Few Suggestions" Canadian Engineer 15 (9 Oct. 1908) p. 728; "Editorial Note", Ibid. 19 (20 Oct. 1910) p. 517.

[32] "President's Address" (Phelps Johnson) TRANS CSCE XXVIII (1914) p. 103.

[33] Members of the CSCE were always concerned that this class would be confused in the public mind with the Associate Member class (a full voting class, one grade junior to full membership) and launched several attempts to change its name. (See eg. Edit. "E.I.C. Classifications", Canadian Engineer 40 [3 Feb. 1921] p. 197). Officially, this class was intended for businessmen, managers and even government bureaucrats, who were not civil engineers, but whose work qualified them to co-operate with engineers to advance professional knowledge. (By-Laws ... s. 9). Unofficially, this classification was a means to exclude and prevent businessmen from dominating the Society, without alienating powerful men, whose influence, prestige and even business contacts in some cases, the CSCE privately courted.

[34] Students and Honorary Members (unless they were previously Members) were also excluded from full membership. Honorary Members were theoretically men eminent in engineering or related sciences, but were usually university benefactors, governors-general, Deans, railway magnates and men (as in the case of Sir Sandford Fleming) who otherwise refused to join the CSCE as regular members. This class was never to exceed twenty members. EIC Letter Books, McLeod to F.O. McDonall, 9 Jan. 1896, p. 86, Council Minutes CSCE, 10 Feb. 1912, p. 87, 30 Oct. 1917, p. 74, 27 Nov. 1917, p. 81; McLeod to Fleming, 12 Mar. 1896, Public

Archives of Canada, Sandford Papers, MG 29, B 1; Fleming to McLeod, Ibid., 19 Mar. 1896.

[35] For a popular account of Sir Herbert Holt's remarkable business career, see, Peter C. Newman, Flame of Power, (Toronto, 1965) chap. 1.

[36] Minutes of Ordinary Meeting, 31 Jan. 1889, p. 181; Council Minutes, 24 Sept. 1889, p. 214; Ibid., 5 Nov. 1889, p. 224.

[37] "Tenth General Professional Meeting: General Welfare of the Institute 'Associates'", Jour EIC IV (Sept. 1921) p. 507. The fact that the Associate Class failed to grow could also be viewed as a testament to the professional standing of the CSCE.

[38] The first discussion regarding the admission of women appears to have been prompted by the application of Mary O'Neil in 1920 (Council Minutes, 18 May 1920, p. 49; Toronto Branch Papers, Box #7, Copy Council Minutes, 18 May 1920, p. 5). The place of women seemed to have been confined to an auxiliary role at social functions as the wives and daughters of members, "Thirty-Six Annual Meeting", Engineering Journal V (Feb. 1922) p. 93.

[39] By-Laws ... (1905) s.7. These requirements were remarkably similar to the ASCE:

> A Member shall be a Civil, Military, Naval, Mining Mechanical, Electrical, or other professional Engineer, an Architect or a Marine Architect. He shall be at the time of admission to membership not less than thirty years of age and shall have been in the active practice of his profession for ten years; he shall have had responsible charge of work for at least five years and shall be qualified to design as well as to direct engineering works. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years active practice. The performance of the duties of a Professor of Engineering in a technical school of high grade shall be taken as an equivalent to an equal number of years of actual practice.

Quoted in Leib, "The Organization and Administration of National Engineering Societies", pp. 286-287. Several years before it was officially recognized in the CSCE's By-Laws, the Council accepted as equivalent responsibility, service as a Professor of Engineering. Toronto Branch Papers, MS 102, Box #3, McLeod to Prof. Arkley, 7 June 1916; By-Laws ... (1919) secs. 7-8.

[40] See H.H. Vaughan's remarks to the Commercial Club of Halifax. "Luncheon at Commercial Club", Jour EIC 1, (Sept. 1918) p. 280. For an analysis of the significance of professional engineering membership standards, see: Edwin T. Layton Jr., Revolt of the Engineers, Social Responsibility and the American Engineering Profession, (Cleveland, 1971), pp. 26-28.

[41] For a discussion of the need for trust and impartiality among professional engineers, see St. George Boswell, "The Engineer Today", Canadian Engineer III (Feb. 1896) pp. 258-259.

[42] "Report of the Annual Meeting", TRANS CSCE XXIV (1912) p. 134; "Report of the Committee on Educational Requirements", Ibid. XXIX (1915) p. 71.

[43] "Report of the Board of Examiners", Ibid. pp. 83, 85.

[44] By-Laws ... (1905) s. 10. By the First World War, comparatively few students were receiving practical training in an Engineer's office — most were enrolled in engineering schools.

[45] "Annual Report", TRANS CSCE IV (1890) p. 45; Ibid. XXV (1911) p. 140.

[46] "Annual Report", Ibid. III (1889) p. 19.

[47] "President's Address" (Galbraith), Ibid. XXIII (1909) p. 109.

[48] For a summary of the rather complicated procedure, see "Procedure for Admission or Transfer", Jour EIC (July, 1918) p. 124.

[49] "Preliminary Notice of Application for Admission and for Transfer", Ibid. (Aug. 1918) p. 172; "Report of Annual Meeting", TRANS CSCE XXIII (1909) pp. 10, 120-121.

[50] Many of these procedures were adopted directly from the ASCE. See Council Minutes, 3 Nov. 1891, p. 80; 17 June 1896, p. 272; 13 Oct. 1896, p. 279; 21 Dec. 1915, pp. 358-359.

[51] Under the old rules, before 1918, a candidate could be excluded if ten percent of the votes cast were negative. (By-Laws ... [1908] s.13) Occasionally a cabal was struck and candidates blackballed. In 1900, for example, six out of fourteen applicants were blackballed (Council Minutes, 19 June 1900, p. 158). As a rule, Council rigorously scrutinized all applications before giving its approval. cf. case of J.N. Tyrell, who issued a misleading record of his professional career, Ibid., 13 Oct. 1896, pp. 278-279.

[52] By-Laws ... (1905) s.32.

[53] Noting that the Society lacked an executive head, since the Presidents usually lived some considerable distance from headquarters, J.A. Jamison remarked that the President was looked upon "as an honorary officer presiding at our annual meeting". "Report of the Annual Meeting", Trans. CSCE XXVI (1912) pp. 71-72.

[54] On the importance of the Secretaries, see H.E.T. Haultain's remarks, Toronto Branch Papers, MS 102, Box #4, "Meeting at Engineers' Club" Minutes, 5 Feb. 1917, p. 15.

[55] McLeod was truly a remarkable man of wide interests and accomplishments. Born in 1851, the son of a Cape Breton merchant, McLeod worked under Sandford Fleming on the Intercolonial Railway, before his graduation from McGill's new engineering department in 1873. McLeod had a keen interest in University athletics and, like most engineering professors, did independent consulting work and gave expert evidence in Court. For forty-three years, McLeod was Superintendent of the McGill Observatory and he achieved some distinction in determining the exact longitude of Montreal. See: EIC Scrap Book, No. 6, Newspaper clipping, Montreal Herald, 27 Dec. 1917, and esp. McGill University Archives, McLeod Papers, Ass. 1640,

Ref. 7 (1), Kirkland McLeod, "Biography of C.H. McLeod", unpub. MS; Malcolm M. Thomson, The Beginning of the Long Dash: A History of Timekeeping in Canada, (Toronto, 1978) p. 8.

[56] "The Story of the Engineering Institute of Canada, 1887-1937", p. 280; "Committee Report of the Canadian Society of Civil Engineers", Contract Record and Engineering Review 32 (23 June 1918) p. 62.

[57] On McLeod's clandestine efforts to secure G.A. Mountain's election as a Vice President, after Mountain had emphatically declined the nomination, see: EIC Letter Books, McLeod to Newton J. Kerr (Private), 12 Dec. 1900, p. 582. On another occasion, McLeod is reported to have kept McGill engineering student CSCE memberships up to date by observing, during his introductory lecture, that many students had let their memberships lapse and further remarking that this might have a bearing on whether they might pass their examinations. Interview: Dr. John Sterling, 2 Aug. 1977, Montreal.

[58] J.G.G. Kerry, "The Past", Engineering Journal XXX (Aug. 1947) p. 369.

[59] McLeod, for example, received only $300.00 (Council Minutes, 2 June, 1891, p. 72) for a job, which, according to his son, Kirkland McLeod, took up a large portion of his time. McLeod Papers, Kirkland McLeod, "Biography of C.H. McLeod", p. 9.

[60] As early as 1904, McLeod drew Council's attention to the increased work load of his office and the need for a full time secretary. Council Minutes, 15 July, 1904, pp. 325-326.

[61] Keith was paid $4,000.00 per annum. He presided over the critical period when the various provincial branches of the EIC, acquired restrictive provincial licensing powers. His most notable contribution was the creation of the Engineering Journal. In 1925, Keith was succeeded by Prof. R.J. Durely, who had occupied the chair of Mechanical Engineering for many years at McGill and, also, had been in charge of gauges and standards for the Imperial Munitions Board, during the First World War. Council Minutes, 29 Feb. 1917, pp. 20-21; Kerry, "The Past", pp. 369-370.

[62] See: "Report of the Annual Meeting" *TRANS CSCE* XXVI (1912) pp. 76-78. As early as 1887, members of the CSCE were aware of the American system of nominations. (See: EIC Papers, T.C. Keefer to H.T. Bovey, 23 Mar. 1887, Montreal.) While the CSCE adopted the American Nominating Committee, it did not adopt their two letter ballot procedure in electing the Nominating Committee. *Ibid.*, p. 76; William H. Wisely, *The American Civil Engineer, 1852-1974* (New York, 1974) p. 35.

[63] EIC Letter Books, McLeod to R. McColl, 2 Dec. 1899, p. 916.

[64] See the remarks of H. Irwin and T.H. White: *TRANS CSCE* (1898) p. 17, *Ibid*. XXVI (1912) p. 80.

[65] "President's Address" (G.H. Duggan) *Ibid*. XXXI (1917) p. 66.

[66] *By-Laws ...* (1905) s. 42.

[67] "Report of the Annual Meeting", *TRANS CSCE* XXV (1911) p. 163.

[68] *cf*. complaints of various members, "Report of the Annual Meeting", *Ibid*., pp. 163-164, *Ibid*. XXVI (1912) pp. 79-80.

[69] Unsigned Letter to Editor, *Contract Record* 28, n. 9 (26 Feb. 1913) p. 42.

[70] R.A. Ross, "Retiring President's Address", *Jour EIC* IV (Mar. 1921) p. 202. In many cases, the burden of travelling expenses was relieved, since several members of Council were connected to railway companies and received free transportation. "Report of the Annual Meeting", *TRANS CSCE* XXIII (1909) p. 85.

[71] *Ibid*. XXVI (1912) pp. 77, 79-80; EIC Scrap Book No. 1, T.C. Keefer, "Circular", 9 Nov. 1897.

[72] Council Minutes, 12 Apr. 1904, p. 313. Attempts to change the By-Laws, in order to permit the nomination

of more than one Presidential candidate, failed because conservatives argued successfully that it was, in John Kennedy's words, "a most indelicate thing" to ask two Presidential candidates — or even two Vice Presidential candidates — to run against one another. Ibid. XXV (1911) p. 165.

[73] By-Laws ... (1905) s.37, p. 11.

[74] Ibid. s.38, p. 11; TRANS CSCE XXVI (1912) p. 76; Jour EIC II (Oct. 1919) p. 681.

[75] EIC Scrap Book No. 1, "Circular" n.d. (1892). So strong was the authority of the Nominating Committee that, when it took the unprecedented action of nominating John Galbraith for President, who, unlike C.H. Rust (his opponent on an opposition ballot), had never been a Vice President, Galbraith's victory was ensured, in spite of fierce opposition from Rust's supporters. "Copy of Anonymous Letter (confidential)", Jan. 1908; Ibid. No. 4, Circular to Corporate members, M.J. Butler, 21 Jan. 1908; Ibid. "Reply to Mr. Butler's Circular", 23 Jan. 1908.

[76] The results were: Kennedy 133, Hannaford 67. Montreal Gazette, 14 Jan. 1892, p. 2. The following year, however, Hannaford succeeded to the Presidency.

[77] "Tenth General Professional Meeting: General Welfare of the Institute", Jour EIC IV (Sept. 1921) p. 508.

[78] Toronto Branch Papers, Box #1, Minutes of the Toronto Branch, CSCE, 12 Oct. 1916, p. 115. Also see H.E.T. Haultain's remarks, Ibid. Box #4, "Meeting at Engineers' Club", 5 Feb. 1917, pp. 7-8, 14.

[79] McGill University Archives, Ass. 1640, Ref. 5, Dean Brown to W.H. Brittain, 8 June 1937, p. 3.

[80] Unsigned Letter to Editor, Canadian Engineer 15 (6 Mar. 1908) p. 148.

[81] EIC Scrap Book No. 1, Circular regarding proposed Amendment to the By-Laws of the Canadian Society of

Civil Engineers, 6 Nov. 1897. The Council for 1897 appears to have had only three Past Presidents, or four if the current President, for that year, T.C. Keefer — who was serving yet another term — is included. *The Engineering Institute of Canada List of Officers for the Years 1887 to 1920*, (Montreal, 1921) p. 43.

[82] "Report of the Council", *Jour EIC* 1 (May, 1918) p. 66.

[83] See, for example, "Report of the Annual Meeting", *TRANS CSCE* XXVI (1912) p. 70; *Ibid*. XXVII (1913) p. 52.

[84] See remarks by H.E.T. Haultain and Willis Chipman, Toronto Branch Papers, MS 102, Box #4, "Meeting at Engineers' Club, Discussion", 5 Feb. 1917, pp. 13-14, 22; Robt. W. King to Editor, *Canadian Engineer* VIII (8 Dec. 1900) p. 162.

[85] University of Toronto Archives, Haultain Papers, B 47 (B72-005) Box #2, H.E.T. Haultain, "The Romance of Engineering" (Jan. 1922).

[86] Many of these values originated in Great Britain. For an historical analysis of the evolution of the professions in pre-industrial and post-industrial Britain, see esp.: Phillip Elliott, *The Sociology of the Professions*, (London, 1972) pp. 14-57.

[87] Layton, *Revolt of the Engineers*, p. 32. By contrast, the American Society of Mechanical Engineers (ASME) was closely connected with business. On the relationship between the ASME and the private American Utility Company interests, see eg., Bruce Sinclair, *A Centennial History of the American Society of Mechanical Engineers, 1880-1980*, (Toronto, 1980) pp. 103-104.

Chapter III

"A SORT OF OUTCAST PEOPLE"
ENGINEERS AND BUREAUCRACY

Engineers were not independent professionals. Most of them were employees of large corporations and governments. This was the most important factor affecting the engineer's professional life. Emerging from the canal and railway building enterprises of the nineteenth century, the engineer was a creature of large bureaucratic organizations — he was the original "organization man".[1]

I

Engineers differed substantially from the older consultative professions. Lawyers and doctors functioned independently in the marketplace; most were self employed, owned and managed their own consulting businesses and, more importantly, were paid by fees. The majority of Canadian engineers, however — approximately eighty-five percent[2] — were salaried employees. Whereas lawyers and doctors maintained their independence, partly by providing an essential consulting service directly to the public, engineers, by contrast, dealt only indirectly with the public as employees of corporations. Even the elite private consulting engineers, comprising less than fifteen percent[3] of the profession, did not enjoy the same degree of independence as lawyers and doctors. The consultant's remuneration was measured by business profit, not professional fees. They were mainly dependent for work on large corporations — especially municipal governments — and moved in and out of consulting, depending on prevailing economic conditions. Some consultants eventually became either salaried employees, or even businessmen-contractors, like Sir Casmir Gzowski.[4]

As employees within a large bureaucracy, engineers had little control over their professional lives. With the exception of a few well paid management engineers, most of them were as vulnerable and insecure as any corporate employee. Even the short hierarchical distance separating engineers from skilled workmen did not give them greater security. Although engineers had exclusive access to technical knowledge essential to business, they were unable to achieve greater independence because, unlike lawyers and doctors, engineers could not control competition. Employers could hire anyone claiming to be an engineer and force him to compete against another.[5] Moreover, while engineers were an essential part of a corporation and enjoyed more prestige than skilled workmen because of their status as experts, in some respects engineers had less power than the workmen they supervised. Whereas workmen were willing to use their power collectively through trade unions in order to bargain for higher wages and job security, before the First World War engineers, essentially for ideological reasons, refused to combine and use their collective power for similar ends.

As well, the engineer's employment was determined by market forces over which he had no control.[6] During periods of economic growth, such as the building of Canada's transcontinental railways, the demand for engineers was high and employment available; but, during harsher times, demand slackened and engineers faced hardship.[7] The mysterious forces of economics and finance placed them in a precarious position. More than any other professional, engineers were directly affected by business slumps.[8] When capital was scarce, corporations could not finance capital expansion. Chronic unemployment became the scourge of the profession and even eminent engineers, such as T.C. Keefer, could not escape it.[9] Although one engineer believed that many engineers survived by marrying their employers' daughters,[10] most of them remained barely solvent. "The result in a great number of cases", observed Arthur Surveyer, a highly respected and prominent French Canadian engineer, "is a bare living wage in boom times and a hand to mouth existence in times of depression ..."[11] This uncertainty of income, noted Surveyer, recalling the findings of the English Lunacy Commission, was the primary reason why engineers had the highest rate of lunacy in Britain, compared with other liberal professions.[12]

Although engineers preferred to think of themselves as independent professionals, they were, nevertheless, acutely aware of their dependent status and their subordination to business. They deeply resented their dependence on financial interests[13] and tended to regard themselves, as one engineer bitterly lamented, "simply as tools of men who know less than they do but are good at business and draw large salaries ..."[14] "Today", protested a Montreal consulting engineer in 1920, "we are too frequently but the creatures of 'politicians' and 'profiteers' doing their bidding; or at any rate, practising our professions very largely by their leaves".[15]

II

Although corporations collectively employed more engineers than governments, by the end of the First World War, with the nationalization of two transcontinental railways, the Dominion Government became the largest single employer of engineers in Canada.[16] While government engineers were not subject to the same degree of uncertainty and unemployment as their colleagues in private companies, their lack of standing as independent professionals created some unique problems.

When the Civil Service Act of 1868 was passed, the Dominion Government employed comparatively few engineers.[17] According to C.E.W. Dodwell, resident engineer for the Department of Public Works, Halifax, engineers were regarded as "necessary evils temporarily employed to carry out specific works, and to be discharged at the earliest possible moment ..."[18] The government had no professional standards for engineers. They were not required to pass an examination, produce testimonials, diplomas or credentials, nor even questioned about their educational background, before assuming positions of responsibility which, in some cases, required the judicious expenditure of large sums of public money.[19] Non-professionals were hired along with eminently qualified engineers and political appointments in such patronage-ridden departments as Public Works cut across professional standards and often resulted in the appointment of incompetents.

As government engineering work became more specialized, however, a permanently employed corps of highly qualified engineers evolved; but, while government engineers had assumed responsibility for important and costly public works, they were not officially part of the Civil Service. The Canada Civil Service Act, 1868, divided public servants into two classes: Departmental Staff, or the Inside Service (generally civil servants employed in Ottawa) and the Outside Service — postal clerks, customs agents, etc.[20]

No provision was made in the Civil Servant Act, 1878, nor in any subsequent amendment prior to 1918-19, for the inclusion of a corps of engineers in any government department. With the exception of a few fortunate ones, most engineers were employed with the Outside Service and were excluded from the civil service.[21] Thus, government engineers were, as A.B. Warburton explained to the House of Commons in 1910, "a sort of outcast people"[22] who lacked the same rights, privileges, responsibility, status and security of tenure, enjoyed by ordinary civil servants. The Government, moreover, did not officially recognize their engineers. The handful employed with the Inside Service were simply classified as clerks and, as a rule, were not promoted unless the clerk immediately senior died or resigned.[23]

Although government engineers enjoyed the relative security of steady employment and were, as William Pugsley, Minister of Public Works in the Laurier Government, pointed out, no worse off than other employees in the Outside Service,[24] they nevertheless felt dissatisfied because of poor employment opportunities and low status. The government was an important source of employment — in some cases the only source — for many engineers who had given years of service and who professed unselfish devotion to serve the public interest. Alternative employment was not always available, nor desirable. More importantly, these engineers believed that their professional education, responsibility and accomplishments, entitled them to special consideration. In their view, their lack of status was unjustified and demeaning.

The Government's failure to recognize its engineers was reflected also by the engineer's low salary.[25] Although government engineers constructed important public works, their remuneration was not commensurate with their responsibility.[26] Relatively unskilled clerks, with modest educational qualifications, often earned more than university-educated engineers. Since labour had become well organized and relatively well paid, by the end of the First World War supervising engineers were sometimes placed in the humiliating position of earning less than foremen and mechanics under their charge.[27]

While many engineers spent their entire professional lives in government service, because they were excluded from the civil service they were not entitled to any benefits, such as pensions or superannuation. Low salaries prevented many from saving, or investing sufficiently large portions of their earnings in annuities and life insurance. Government engineers had no real security against accident, sickness or death; if an engineer died, or was incapacitated while in government service, neither he nor his family could receive any compensation.[28] These and other disadvantages contributed to a growing sense of discrimination and alienation among government engineers. While the government eventually brought its engineers under the regulation of the Civil Service Commission after 1918, government engineers were still faced with a long struggle to win recognition as professionals.

III

No other government engineers had as much trouble with their employers as municipal engineers. As cities grew in size and number, under the impact of industrialization and immigration, there was a corresponding growth in conflict between city engineers and city councils. Although much of this trouble had its roots in the Byzantine intrigue of municipal politics, its real cause was the city engineer's lack of professional autonomy. Like their counterparts in the Dominion Government, city engineers could not function with the power and authority of independent professionals.

As cities became more technically complex, elected officials were forced to hire experts, especially engineers,[29] to help run the new metropoles. Although the city engineers' responsibilities grew as urban technology became more sophisticated,[30] they did not experience a corresponding growth in authority; executive power rested with non-technically trained ward aldermen, who governed with a different set of values and priorities.[31] As ordinary municipal employees, city engineers were entirely subject to the will of elected officials and their political appointees. They had no authority to initiate work, nor set policy.[32] The city engineers' influence varied directly with their ability to persuade politicians to adopt their recommendations — a talent few possessed.

In contrast with other professionals, city engineers did not command authority and respect from municipal politicians. These officials viewed them with indifference and suspicion. Civil engineering, unlike electrical or industrial, did not have an aura of esoteric mystique in the public mind. Civic politicians, raised in rural nineteenth century Canada, were accustomed to the rule-of-thumb methods of the practical man. They regarded themselves as pragmatic men fully equal to understanding most practical problems. A municipal engineer, in their view, was nothing more than a glorified and slightly pretentious mechanic who failed to comprehend the more important political imperatives of city government.

This attitude adversely affected city engineers. They frequently complained that elected officials interfered in all phases of their work, offered gratuitous professional advice and made important engineering decisions without understanding the technical implications. More importantly, city engineers bitterly protested that their expert advice was often ignored — even distorted — for partisan reasons.[33] As civic officials appeared to respect the professional opinions of medical and legal advisors, city engineers could not understand why a municipality would engage them and then proceed to ignore their advice.[34] This behaviour was entirely inconsistent with their experience in private corporations.

City engineers deeply resented their lack of independence and authority. They disliked not having full charge of city engineering and being subject to politicians whom they disdainfully regarded as their intellectual, social and moral inferiors. "[C]ould anything be more humiliating to a member of the engineering profession", lamented one engineer, "than to have a board of men [city council] selected from the ranks of the trades and industrial classes, preside over his deliberations ..."[35]

As well, city engineers were torn by conflicting loyalties to science and their employers. They recognized that professional judgments had to be made objectively, without regard to political considerations, even at the risk of dismissal;[36] yet, they also realized they were bound to serve their employers' interests. This situation presented a cruel dilemma: if an engineer was influenced politically, he compromised himself professionally; if he were strictly professional, he risked alienating his employer.

This predicament was further complicated by the fact that, unlike a business corporation with clearly defined lines of authority, in which an engineer was ultimately responsible to one employer, the city engineer, in effect, had several employers — the city council — which, in turn, was divided by many factions, each anxious to enlist the engineer in their partisan schemes. If an engineer's professional report unintentionally supported one faction, for example, he was invariably attacked by the opposing faction.[37] As well, in the normal course of their duties, city engineers constantly risked offending individual citizens, or interest groups, who had influence with city government.[38]

At the same time, the political priorities of politicians often conflicted with the technical capabilities of city engineers. Ambitious city politicians, with grandiose engineering projects, for example, or newly elected city councils with election promises to keep, frequently made unrealistic and technically unsound demands on the city engineer.[39] When ill-conceived policy resulted in engineering trouble, the city engineer, who was responsible for implementing policy, was usually held responsible. Moreover, city engineers were expected to master a wide range of engineering specialties, which cut across many branches of engineering — electrical, mechanical, sanitary, water-works, transportation — in addition to possessing considerable administrative and legal knowledge.[40] In towns and smaller cities, they often had to be both designing and constructing engineers and, unlike doctors and lawyers, could not seek specialized advice from outside consultants. As urban technology became complex and the city engineers' duties expanded, it was inevitable that something would go wrong.[41]

As public works was the municipality's largest spending department,[42] and more than any other department directly affected the health and comfort of ratepayers, any engineering problem immediately resulted in serious political trouble. City engineers maintained that unscrupulous city politicians, ever mindful of their political survival, used them as scapegoats for their own administrative incompetence.[43] Indeed, many city engineers were subject to frequent violent attacks on their professional and personal characters, in the press and in city councils. This usually resulted in arbitrary dismissal without impartial hearing, ruining the professional reputation and civic standing of many city engineers. It often undermined the confidence of respected, eminent engineers and lowered the status of the profession in the eyes of the public.[44]

To a certain extent, the city engineer's lot was not appreciably different from most employees in large corporate bureaucracies.[45] Lack of recognition, interference, internal power struggles and arbitrary dismissals, were not confined to municipal corporations. It could be argued, with some justification, that city engineers were partly the architects of their own misfortune. They failed to adequately assert themselves and to impress politicians with the esoteric nature of their technical problems, in order to reinforce their own positions as experts.[46]

As well, city engineers never fully accepted their dependent status and continued to think of themselves — perhaps somewhat unconsciously or through wishful thinking — as noble, independent professionals,[47] unjustly caught up in a tangled web of bureaucracy and political intrigue. In part, this was a reflection of their technocratic outlook, which placed the engineer at the centre of an ideal municipal administration with executive, almost authoritarian power. From this perspective, city engineers failed to appreciate, or even admit to non-technical or political factors affecting municipal government. They seemed almost blinded by the conviction that all municipal problems were amenable to scientific solutions. This was the reason for their reluctance to perceive realistically their own shortcomings and their readiness to blame other factors. Most city engineers, however, probably would have been content with more professional autonomy within the existing municipal structure.[48]

IV

While engineers realized that their predicament ultimately stemmed from lack of independence and professional recognition, they also recognized that ordinary market forces made their existence even more tenuous and insecure. City engineers, for instance, were forced to compete for work with non-professionals, especially in smaller urban centres. As a rule, small towns, like small businesses, could not afford engineers[49] and rarely appreciated their value. While local practical men fulfilled minor engineering requirements by using traditional rule-of-thumb methods, larger projects, such as water works or sewers, were given to contractors who sometimes attempted to avoid hiring engineers in order to minimize expenses.[50]

City engineers, moreover, were not well paid; they generally earned less than their counterparts in private business, doing comparable work. With a large supply of civil engineers on hand, municipal employers could easily offer lower salaries. Toronto, for example, paid its assistant department heads in the Public Works Department, engineers in actual charge of construction work, less than foremen under their charge. In other centres, professionals, such as city solicitors, sometimes earned twice as much as city engineers.[51]

As well, city engineers did not enjoy security of tenure. Their employment was directly dependent on market forces which allowed city councils to retain engineers during prosperous times and forced them to dismiss, or to reduce their salaries during difficult times. An extraordinary example of this process occurred in Kitchener in 1917. Pursuing a policy of retrenchment, the City Council of Kitchener voted to fire its city engineer, Herbert Johnson, and hire another engineer at a much lower salary. Johnson, a CSCE member and a fourteen year veteran of Kitchener's engineering department (seven as City Engineer) was not charged with incompetence, nor asked to take a lower salary. He had not had any serious dispute with the City Council. The whole affair arose from an attempt to lower the municipal tax rate by reducing the budget of a number of civic institutions. As a further economy measure, one alderman proposed to reduce the City Engineer's salary by fifty percent. With the support of a local citizens' group (as well as a shabby attempt to bribe two aldermen to vote for Johnson's dismissal), Johnson was fired and another engineer was hired at half his former salary.[52]

The Kitchener City Council's high handed treatment of Johnson upset many engineers. The Canadian Engineer described the incident as "cold-blooded commercialism";[53] but similar incidents had occurred in other cities and city engineers realized that they were powerless to do anything. The CSCE was criticized for its inaction and failure to protect city engineers.

Much of this discontent had developed before the First World War[54] and one manifestation of it was an attempt to form a separate engineering society, dedicated exclusively to municipal engineers. This idea, however, did not have much support. Promoters were divided as to forming a branch of an existing British or American society in Canada, or organizing a distinct Canadian society.[55] More importantly, like the CSCE, the proposed society could not protect its members, since it was conceived primarily as a learned society.[56]

Nevertheless, for a growing number of engineers, other more direct and effective measures were needed to protect city engineers. These men saw the CSCE as the most effective instrument to achieve this end. They argued that the Society should intervene on behalf of city engineers, particularly in the cases where they were dismissed unjustly without a fair hearing.[57] The Contract Record, for example, believed that

> In the lower plane the unions protect the interests of the humblest worker ... Why then, in the highest sphere should not a professional body such as the C.S.C.E. concern itself with the interests of its members? The main objective in view in the organization of the Society — the promotion of engineering knowledge, is a somewhat different matter from the arbitration of private disputes, but times are changing and the Society must also change — the Scope of usefulness must be widened — if the profession is to maintain its place above the sordidness of competition, graft and the influence of city councils ...[58]

√

But, while the Contract Record and other critics of the CSCE wanted the Society to intervene on behalf of city engineers, they stopped short of advocating interference between an engineer and his employer. Instead, they suggested a different form of intervention whereby a committee of the CSCE would act as an impartial expert commission, in order to investigate charges of professional incompetence. This idea was predicated on the belief, popular with all professions, that only an expert is qualified to judge other experts, because professional work involves esoteric knowledge. Like the disciplinary committees of the legal and medical professions, a commission of engineers would be advantageous because it would tend to shelter city engineers from the arbitrary control and scrutiny of the despised ward aldermen and other laymen, particularly judges.[59] This, in turn, would enhance the status and independence of city engineers even though they remained essentially employees.

Nevertheless, the idea of an expert commission was never systematically developed by opinion makers, such as the Contract Record, nor seriously entertained by the CSCE. The idea stemmed from the naive assumption that ward politicians would relinquish partial control over such an important public servant as the city engineer, or even that they desired objective, non-partisan investigation of his work.

V

The question whether the CSCE should protect individual members in their disputes with employers was debated earlier at the CSCE's Annual Meeting in 1911. At this meeting, a controversy arose over what action the Society should take in regard to the unjust treatment of W.A. Clement, City Engineer of Vancouver.

Prior to the 1910 Vancouver municipal elections, the City Engineer was harshly criticized for the construction of certain city streets. Immediately following the election, City Engineer Clement requested an impartial investigation of the allegations by a board of engineers. The Mayor, an opponent of the engineer and publisher of a newspaper which was hostile to Clement, appointed an investigation committee composed of newly-elected aldermen. This committee hastily reported within twenty-four hours and arbitrarily recommended the appointment of a new supervising engineer.[60] The Vancouver members of the CSCE appealed in vain to the City Council for a fair hearing for Clement. They felt that the CSCE was obliged to defend an unjustly treated brother engineer, especially when his reputation was at stake. Accordingly, at the 1911 Annual Meeting, they read a motion censoring the Vancouver City Council.[61]

The Montreal Clique's response was immediate and predictable. G.H. Duggan, Second Vice President and

Chief Engineer of the Dominion Bridge Company,[62] thought that while it was proper for the Vancouver members as individuals to try and influence the Vancouver City Council, the CSCE, as a society, should take no action. Although the CSCE's primary object was to further professional knowledge, Duggan maintained that while the Society had advised Dominion and Provincial Governments on legislation affecting the welfare of the profession, it had "kept strictly out of politics and out of all controversy with the public ..."[63] CSCE interference was unprecedented and unconstitutional. For John Kennedy, the issue was more clear cut. The CSCE, he declared, was "a scientific body and not a trade union". Although he regretted that Clement did not receive a fair hearing, he argued that the CSCE did not have the right to interfere between an engineer and his employer.[64] In a committee report to the Annual Meeting, some of the leading members of the Montreal Clique, John Kennedy, C.H. Rust and G.A. Mountain, strongly recommended that the CSCE take no action. The Annual Meeting concurred and the Montreal Clique won another major victory — but it was its last.[65]

The Vancouver members never contemplated interfering in what was essentially a labour dispute. They recognized the employer's prerogative of dismissal and never entertained any thought of coercion through collective action. Their main concern was to clear Clement's name by a proper investigation — an objective especially urgent since no charge had ever been brought against the engineer. Their abortive attempt to censure the Vancouver City Council was an act of exasperation,[66] since the CSCE had neither the power nor the prestige with which to influence city councils. It was a dramatic demonstration of the city engineers' growing frustration with their tenuous position within municipal governments.

Even if the CSCE possessed the will and the constitutional authority, it could not have interfered in a labour dispute. Unlike a trade union, the CSCE had no coercive power; it could neither organize a strike, nor boycott a bad employer.[67] Employers could easily hire any engineer, including CSCE members and non-professionals, because, unlike other professionals, engineers did not control or regulate practice. Above all, engineers did not command authority and respect from employers like independent professionals. Before the First World War, employers regarded engineers merely as ordinary skilled workmen with essential practical knowledge.

The CSCE's refusal to intervene in labour disputes was consistent with earlier decisions involving the Grand Trunk Railway in 1896[68] and the Grand Trunk Pacific Railway in 1904. The controversy over the Vancouver City Engineer, in 1911, dramatically revealed the

CSCE's deficiencies as a learned society. These shortcomings would fuel a more heated debate after the First World War, which could erupt into unyielding demands for substantial radical change. In the meantime, as ordinary employees, engineers had no control over their professional lives. They were at the mercy of their employers and the CSCE had neither the will nor the means to protect them.

NOTES

[1] Edwin T. Layton Jr., The Revolt of the Engineers: Social Responsibility and the American Engineering Profession (Cleveland, 1971) p. 2.

[2] "Toronto Engineers Framing New Code of Ethics", Canadian Engineer, 39 (9 Dec. 1920) p. 597. This figure appears to be broadly representative of most estimates.

[3] Hyman Goldman to Editor, Ibid, 34 (9 May 1918), p. 409. This estimate is based on the percentage of private consultants in the CSCE, the only representative body of professional engineers in Canada.

[4] After completing the Grand Trunk main line from Toronto to Sarnia (Gzowski's last venture in actual railroad building, which laid the basis of his personal fortune) Gzowski and his partner, Sir David Macpherson, operated as railway contractors for a number of years. "Obituary", Transactions, Canadian Society of Civil Engineers [hereafter cited: Trans. CSCE] XIII (1899) pp. 192-193; Ludwik Kos-Rabcewicz-Zubkowski and William Edward Greening, Sir Casmir Stanislaus Gzowski: A Biography (Toronto, 1959) pp. 80-81.

[5] One common cost-cutting practice among employers, for example, was to request job applicants to name their salaries and then hire the engineer who quoted the lowest. "Classification and Remuneration of Engineers", Canadian Engineer, 43 (20 Dec. 1922) p. 602; Council Minutes, 22 June 1920, p. 63.

[6] Engineers had always clearly understood that engineering was, as H.A. Goldman put it, "closely allied with economics". H.A. Goldman, "Rise and Fall in Prices", Engineering Journal, V (March 1922) p. 140.

[7] "President's Address" (M.J. Butler), Trans CSCE XXVIII (1915) p. 107; Edit. "Unemployment Situation", Journal of the Engineering Institute of Canada [hereafter cited Jour EIC] IV (Oct. 1921) p. 546.

[8] Alan Macdougall argued that one of the reasons why engineers were the first professional groups to feel the effects of bad times was that public improvements were regarded by authorities as "luxuries" to be delayed as long as the public purse was light. Alan Macdougall, "Professional Prospects", Papers Read Before the Engineering Society, School of Practical Science, No. 7 (1893-4) p. 7.

[9] Unlike mining engineers, who, generally, were permanently employed, often in the same location, civil engineers were discharged after the completion of a project. (T.C. Keefer, "A Sequel to the Philosophy of Railroads", in H.V. Nelles, ed. Philosophy of Railroads and Other Essays by T.C. Keefer [Toronto, 1972] pp. 96-97). The CSCE had always recognized the problem of chronic unemployment among its members and was lenient with members in arrears with membership dues during depressions. See, eg. Council Minutes, 8 Dec. 1896, p. 296.

[10] N.C. Mills to Editor, Canadian Engineer, 37 (23 Dec. 1919) p. 562.

[11] "Discussion on the Law and the Engineer", Trans CSCE XXX (1916) p. 369.

[12] Ibid., pp. 367-368.

[13] Edit. "A Slack Time for Engineers", Canadian Engineer, 26 (22 Oct. 1914) p. 573.

[14] J.L.G. Stuart, "Engineering Among Other Professions", Ibid. 26 (2 Apr. 1914) p. 543.

[15] Charles A. Mullen, "Trade Unions and Engineers", Contract Record, 34 (28 Jan. 1920) p. 78.

[16] "Employment Bureau", Jour EIC, 1 (8 Dec. 1918) p. 435.

[17] EIC Scrap Book, "Memorial to Sir Wilfrid Laurier", 18 Nov. 1910.

[18] "Report of the Annual Meeting", Trans CSCE, XXIV (1910) p. 83. Dodwell became the foremost advocate of upgrading the status of engineers in the public service.

[19] Ibid., p. 82; Edit. "Work of the Can. Soc. C.E.", Contract Record, 24 (2 Feb. 1910) p. 31; C.E.W. Dodwell to Editor, Canadian Engineer, 34 (25 Apr. 1918) p. 362.

[20] See Robert MacGregor Dawson, The Civil Service of Canada, (London, 1929) pp. 19-20. An important rejoinder to this pioneering study is: Robert Borden, "Problem of an Efficient Civil Service", Canadian Historical Association Annual Report, (1931) esp. pp. 5-21. For a recent study, see: J.E. Hodgetts, et al., The Biography of an Institution: The Civil Service Commission of Canada, 1908-1967, (Montreal and London, 1972).

[21] "Report of the Annual Meeting" (1910) p. 83.

[22] Canada, House of Commons, Debates, (17 Jan. 1910) p. 2024. Warburton was the first Member of Parliament to plead the cause of the government engineer in the House of Commons.

[23] "Ottawa Branch News", Jour EIC, 1 (1 May 1918) p. 61. In 1918, in the Public Works Department, there were over one hundred engineers employed, out of which only three were on the Civil Servant List, classified as clerks. C.E.W. Dodwell to Editor, p. 363.

[24] Debates, (17 Jan. 1910) p. 2030.

[25] Poor salaries were common throughout the civil services, Dawson, Civil Service of Canada, p. 76.

[26] Fraser S. Keith considered salaries to be so low as to be, in some cases, "an affront to the profession". Edit. "Salaries of Engineers", Jour EIC, 11 (1 Jan. 1919) p. 18.

[27] Edit. "The Technical Man's Salary", Contract Record, 32 (9 Oct. 1918) p. 804; "Memorandum presented

to the Members of Parliament of the Lower Mainland of British Columbia by the Vancouver Branch of the Engineering Institute of Canada", University of Toronto Library, CSCE Toronto Branch Papers, MS 102, Box #6, n.p.; "The Salary Situation", Jour EIC, 11 (5 May 1919) p. 410.

[28] "Report of the Annual Meeting" (1910) pp. 85-87; Dodwell to Editor, Canadian Engineer, pp. 363-364.

[29] A leading consulting engineer, R.O. Wynne-Roberts, who specialized in municipal work, estimated that there were from 300 to 500 engineers engaged on municipal work in Canada in 1913. R.O. Wynne-Roberts to Editor, Canadian Engineer, 25 (10 July 1913) p. 151.

[30] For a contemporary historical survey of municipal engineering, see R.O. Wynne-Roberts "Municipal Engineering", Jour EIC IV (Feb. 1921) pp. 110-114.

[31] As the heads of major municipal departments, city engineers complained that their executive powers were not clearly defined and that they could not exercise the necessary authority to carry out their responsibilities. Edit. "Responsibility", Canadian Engineer, 16 (26 Mar. 1909) p. 415.

[32] This fact was clearly understood by city engineers. ("A Supervising Engineer", Ibid. 15 [31 July 1908] p. 520. Edit. "Engineers and City Government", Ibid. 29 [20 Apr. 1915] p. 311). Engineers were resentful of the fact that, while the prerogative of administering a department belonged to a political appointee — usually an ex-ward politician — it was the engineer with his technical knowledge who actually ran the department and kept the political head out of trouble. Frederick B. Goedike to Editor, Ibid. 34 (23 May 1918) p. 469.

[33] "Report of the Annual Meeting", Trans CSCE, XXIII (1909) pp. 118-119; Edit. "Expert Advice", Canadian Engineer, 18 (16 June 1910) p. 604; Edit. "Time for a Change in Municipal Government", Ibid. 28 (25 Mar. 1915) p. 391.

[34] Edit. "Untimely Interference with the City Engineer", Contract Record, 24 n.18 (4 May 1910) p. 35;

Unsigned letter to Editor, *Ibid*. 26, n. 37 (11 Sept. 1912) p. 41; "The Rights of an Engineer", *Canadian Engineer*, 111 (12 Apr. 1896) p. 328. In the 1880's Toronto's Medical Health Officer had similar misgivings about city politicians. See, eg. Heather Anne MacDougall, "'Health is Wealth': The Development of Public Health Activity in Toronto, 1834-1890", (Unpublished Ph.D. dissertation, University of Toronto, 1981) p. 353-355.

[35] J. Grant MacGregor to Editor, *Ibid*. XIV (4 Oct. 1907) p. 367.

[36] Edit. "Municipal Engineers", *Ibid*. (23 Aug. 1907) p. 337; the *Canadian Engineer* praised engineers who were dismissed for maintaining their professional stand. "Rights of the Engineer", p. 338.

[37] Commentators often pointed out that City Engineers were forced to exercise political skills, apart from their varied duties, in order to survive and carry out their responsibilities. Edit. "City Engineers and their Difficulties", *Ibid*. 20 (2 Feb. 1911) p. 253; "Moncton Branch", *Jour EIC*, IV (Feb. 1921) p. 155; "President's Address" (C.H. Rust) *Trans CSCE*, XXVI (1912) p. 107.

[38] Edit. "Protection of the Municipal Engineer", *Contract Record*, 23, n. 26 (30 June 1909) p. 31.

[39] Edit. "Responsibility", *Canadian Engineer*, 16 (26 Mar. 1909) p. 415; Unsigned Letter to Editor, *Contract Record*, 25, n. 46 (15 Nov. 1911) p. 38.

[40] St. George Boswell, "The Engineer Today", *Ibid*. III (10 Feb. 1896) p. 258; Edit. "The City Engineer and the City Council", *Ibid*. 15 (13 Nov. 1908) p. 807; Edit. "An Institute for Municipal Engineers", *Ibid*. 25 (10 July 1913) p. 149.

[41] Edit. "Is Municipal Engineering on the Decline?", *Contract Record*, 26, n. 14 (3 Apr. 1912) p. 39; J. Antonisen to Editor, *Ibid*. 26, n. 18 (1 May 1912) pp. 41-42.

[42] Edit. "Wanted — Men", *Canadian Engineer*, 15 (17 Jan. 1908) p. 48.

[43] Edit. "Status of the Engineering Profession", Contract Record, 27, n. 45 (5 Nov. 1913) p. 39; Edit. "By What Authority Shall a City Engineer be Tried?", Ibid. 26, n. 35 (28 Aug. 1912) p. 39; "City Engineers and Civic Mismanagement", Ibid. 25, n. 52 (27 Dec. 1911) p. 38.

[44] "President's Address" (C.H. Rust) p. 112; One of the things that made an impression on a prominent English engineer, visiting Canada, was the intensity of press attacks upon city engineers in comparison with Great Britain. "A Westminster Engineer's Impression of Municipal Work in Canada", Ibid. 25, n. 48 (29 Nov. 1911) p. 35.

[45] Provincial government engineers also appear to have experienced similar unjust treatment to that suffered by municipal engineers. Compare, for example, the case of J.W. Roland, Chief Engineer of the Highways Board, Nova Scotia, who was summarily dismissed without apparent reason. "Halifax Branch", Jour EIC, IV (June 1921) pp. 381, 383.

[46] Andrew F. Macallum to Editor, Contract Record, 26, n. 36 (4 Sept. 1912) p. 41; J. Antonisen to Editor, p. 41. Edit. "Engineers and City Government", p. 311; Even the Canadian Municipal Journal remarked that it was strange that very little was heard from municipal engineers. "The Engineering Profession and Municipal Administration", Canadian Municipal Journal, XVI (May 1920) p. 138.

[47] J.E. Hodgetts, for example, has observed an "autonomous spirit" among such highly respected engineers as Samuel Keefer and noted how frequently these engineers assumed complete authority for works, believing that the politicians were too ignorant of the pertinent technicalities. (J.E. Hodgetts, Pioneer Public Service: An Administrative History of the United Canadas, 1841-1867, [Toronto, 1955] p. 204). City engineers also displayed "an autonomous spirit". This may account, in part, for their frequent clashes with politicians.

[48] As one engineer put it: "A city council should direct on general lines the policy they wish their engineers to follow, leaving technicalities and details of construction to the engineer ..." Unsigned letter to Editor, Contract Record, 25, n. 46 (15 Nov. 1911) p. 38.

[49] Harry Bragg, "Engineers — and Engineers", Canadian Municipal Journal, XV (Dec. 1919) p. 409.

[50] Herbert J. Bowman, "Municipal Engineering in Ontario", Papers ... School of Practical Science, no. 10 (1896-1897) p. 178; Edit. "Counties and their Engineers", Canadian Engineer, 28 (20 May 1915) p. 587; A.N. Reed, "Functions of Urban Municipalities in the North-West Territories: Public Works and Public Utilities", Saskatchewan History, X (1956) pp. 88-89.

[51] Edit. "Question of Salaries", Canadian Engineer, 19 (13 May 1910) p. 466; edit. "The Salaries of Engineers" p. 607. Toronto had such a high turnover of municipal engineers that it became known as a training ground for engineers who moved on to other cities for higher salaries. Ibid. City engineers believed that it was poor economy to hire non-professionals in order to save money, since bad engineering work would invariably cost the city more money. See, edit. "A Town Engineer for Barrie, Ont.", Ibid. 18 (13 May 1910) p. 466; Bragg, "Engineers — and Engineers", p. 409.

[52] Edit. "'Wanted — A Cheaper Engineer'", Canadian Engineer, 32 (29 Mar. 1917) p. 281; "Kitchener's New Engineer", Ibid. 32 (17 May 1917) p. 425; "How Kitchener Fired its City Engineer", Ibid. 32 (14 June 1917) p. 497.

[53] Edit. "'Wanted — A Cheaper Engineer'", p. 281.

[54] Edit. "Is Canada Big Enough for a Municipal Engineering Society?" Contract Record 38 (17 Sept. 1913) p. 41. J. Antonisen, City Engineer of Moose Jaw, bitterly described the CSCE's attitude as "'Each Man for Himself, etc.'", J. Antonisen to Editor, Ibid. 26, n. 37 (11 Sept. 1912) p. 41.

[55] Edit. "Hamilton City Engineer's Suggestion", Ibid. 27, n. 46 (12 Nov. 1913) p. 39; J.W.B. Blackman to Editor, Ibid. 27, n. 48 (26 Nov. 1913) p. 38; R.O. Wynne-Roberts to Editor, Canadian Engineer, 25 (10 July 1913) pp. 151-152. Wynne-Roberts was the leading advocate of forming a distinct Canadian Society. A provisional committee, consisting of a representative cross section of Canadian municipal engineers, including eight

prominent engineers, was formed to draft a constitution for the proposed society — Canadian Institution of Municipal Engineers. Edit. "The Proposed Municipal Engineering Organization", Contract Record, 27, n. 45 (5 Nov. 1913) p. 39.

[56] The Canadian Engineer was the only critic of the proposal. This journal agitated against the proposed society, arguing that while the idea of a municipal organization was good, the proposed organization should be formed as a section within the CSCE, since most City Engineers were already CSCE members who could keep better informed of new engineering developments in all branches of the profession from inside the larger national society. (Edit. "An Institution for Municipal Engineers", p. 150; Edit. "Organization Among Municipal Engineers", Ibid. 25 (28 Aug. 1913) p. 374. The Contract Record, however, disagreed and asserted that the CSCE had "not taken an active part in things of vital interest to municipal engineers" and that the Society was neither equipped with the constitution, nor the disposition to serve municipal engineers. Edit. "Is Canada Big Enough for a Municipal Engineering Society?", Contract Record, p. 41.

[57] "Report of Annual Meeting — Discussion", Trans CSCE, XXII (1908) p. 10; Council Minutes, 10 March 1908, p. 206. Engineers were particularly outraged by summary dismissals for frivolous reasons, such as the dismissal of a city engineer from the West who was fired for wearing kid gloves and attending afternoon teas. "Report of Annual Meeting" (1908) pp. 59-61.

[58] Edit. "Municipal Administration", Contract Record, 25, n. 48 (29 Nov. 1911) p. 34. The Editor of the Contract Record also took the initiative of writing the President of the CSCE to urge the Society to intervene in a number of cases involving city engineers in the West. The Council, however, declined to act on the grounds that no representations had been made to the CSCE by individual members, Council Minutes, 9 Dec. 1911, p. 72.

[59] City engineers sometimes had their work investigated by judges. As members of the legal profession, engineers had the same contempt for judges as they had for lawyers. In their view, judges were biased and ignorant of technical work and were, therefore, incompetent to pass judgment on engineering. Only engineers should judge

other engineers. (See eg. J. Antonisen to Editor, Ibid., pp. 41-42; Unsigned letter to Editor, Ibid. 26, n. 38 [18 Sept. 1912] p. 42). The Contract Record went so far as to suggest that City Councillors were not qualified to choose their engineers and that a special board of engineers from the CSCE should recommend qualified candidates. "City Engineers and Civic Mismanagement", Ibid. 25, n. 52 (27 Dec. 1911) p. 38.

[60] See "Report of Annual Meeting", Trans CSCE XXV (1911) p. 157.

[61] Ibid., p. 158.

[62] "Biography" (G.H. Duggan), Applied Science, New Ser. VI, n. 2 (June 1912) pp. 74-75.

[63] "Report of Annual Meeting" (1911) p. 160.

[64] Ibid., pp. 175-176, 179; in a similar vein, Prof. E.P. Fetherstonhough argued that the Society's effort to raise its status would be undermined by any action which would associate the CSCE with trade unionism, in the eyes of the public. Ibid., p. 179.

[65] Ibid., p. 176. Another motion to send a copy of a resolution regretting the Vancouver City Council's action in discharging Clement, without reason, was defeated on the grounds that it was contrary to the Society's precepts and it would probably place the CSCE in "a very undignified position" since, it would either be ignored or the CSCE would not receive a reply. Ibid., pp. 177-179.

[66] The Canadian Engineer saw the whole question as more "a sentimental one than a practical one", the result of which was that Clement could declare that the CSCE supported him, in so far as he was discharged without a fair hearing. Edit. "City Engineers and their Difficulties", Canadian Engineer, 20 (2 Feb. 1911) p. 253.

[67] For example, the CSCE's attempt to discourage its members from applying for City Engineer Johnson's position in Kitchener — in effect, an ad hoc professional boycott — failed miserably. CSCE Toronto Branch Papers,

MS 102, Box #4, Oliver to F.S. Keith, 30 Mar. 1917; Ibid., Keith to Oliver, 2 Apr. 1917; Edit. "Wanted — A Cheaper Engineer", p. 281.

[68] Minutes, Ordinary Meeting, 23 April 1896, pp. 32-33. In 1900, when John Galt requested an investigation of his dismissal as City Engineer, Ottawa, the Council advised Galt that such action was beyond the powers of the CSCE and suggested that Galt take individual legal action. Council Minutes, 9 Oct. 1900, p. 159.

Chapter IV

"THE FOREIGN INVASION"
ENGINEERS AND COMPETITION

During its early stages of development, Canada needed foreign engineers; but, by the end of the nineteenth century, Canada had produced a corps of capable and experienced engineers who were already building spectacular new works which were attracting world wide attention. By this time, American engineers had displaced British as the dominant alien engineering group in Canada and, as their ranks expanded, Canadian engineers increasingly found themselves in competition with Americans.

Unlike lawyers and doctors, Canadian engineers were not protected from foreign competition. Even after the enactment of the weak and ineffectual Alien Labour Law in 1897,[1] a free North American engineering labour market existed and Canadian engineers were forced to compete with Americans on an equal basis in their own country. But, as Canadian engineers acquired confidence, drive and ambition, they began to resent being passed over in favour of Americans of equal or lesser ability, especially for government contracts. Moreover, competition with American engineers threatened the livelihood of many engineers, particularly during hard times.[2] Ultimately, the problem of foreign competition raised serious questions about whether the CSCE, as a learned society, could, or even should attempt to restrict foreign competition, in order to protect the interests of its members.

I

One of the most celebrated cases involving alien engineers in Canada occurred during the survey and location of the Grand Trunk Pacific Railway (G.T.P.), a subsidiary of the Grand Trunk Railway. Although this case was highly controversial, in many respects it was typical of several others that occurred before the First World War.

In May, 1902, Charles H. Hays, an American who was General Manager of the Grand Trunk Railway, offered H.D. Lumsden an assistant chief engineership, at $4,000.00, for what Lumsden understood was maintenance work on the Grand Trunk. The G.T.P. was not mentioned, according to Lumsden, who declined the offer. Without attempting to recruit another Canadian, Hays wrote a confidential letter to J.W. Kendrick, third Vice President of the Atchison, Topeka & Santa Fe Railway, asking him to recommend an engineer to take charge of the G.T.P. surveys. Kendrick replied and suggested a young American engineer, J.R. Stephens, who was subsequently retained by Hays at the substantially higher salary of $7,500.00.[3]

About thirty years of age, Stephens was considerably younger than most engineers in charge of comparable work. Except for a few years spent in South Africa, engaged in mining — until he was compelled to leave under mysterious circumstances in 1896[4] — Stephens had spent his entire career in the United States. He had no engineering experience in Canada and did not know any Canadian engineers.[5] As he was neither a member of the CSCE nor even the ASCE he lacked the essential contacts with which to locate suitable Canadian engineers.[6] Following Van Horne's hiring practices on the CPR, Stephens employed American engineers he knew. All the Division Engineers — his immediate subordinates — the Chief Clerk and Office Engineer, for example, were Americans and former associates of Stephens in South Africa, or on the Santa Fe, or Northern Pacific Railroads.[7]

Stephens also utilized a network of American railway company executives to help him recruit other American engineers. He personally intervened to persuade some American employers to release engineers for service on the G.T.P. and even obtained a harbour engineer who took a temporary leave from his position with the U.S. Hydrographic service. As an inducement to come north, Stephens and his associates offered the American engineers higher salaries than they were receiving in the United States.[8]

Although the G.T.P. head office in Montreal received at least one hundred applications from qualified Canadian engineers,[9] none were employed, in spite of company policy to give Canadians preference where qualifications were equal. Stephens' total effort to employ Canadians, he later admitted, was confined to "occasional talks" with engineers that he "happened to meet".[10]

The recruiting of the survey parties was delegated to the Division Engineers. In many cases, they also hired engineers directly from the United States, at higher salaries, through their own recruiting networks. Not only did G.A. Kyle, Division Engineer at Winnipeg, hire his brother and nephew, but he also forced the resignation of a Canadian engineer, Cecil Goddard, as a result of hiring an American, at a higher salary, to a position originally promised to Goddard.[11]

Kyle's preference for American talent perhaps stemmed from his unfavourable opinion of Canadian engineers. "We are in the unpleasant situation", Kyle wrote to an applicant in the United States, "where it is advisable to fill the minor positions with natives and are therefore rather handicapped". To an engineer in Idaho, Kyle said he regretted that company policy was to use Canadians, but added that he thought that "later on we will have to import some American brains in order to carry the thing out successfully".[12]

Although the CSCE had anticipated trouble as early as 1903 and advised the government that Canadian engineers should be employed,[13] the government did not take notice of the problem until the Leader of the Opposition, Robert L. Borden, raised the matter in the House of Commons on 13 May, 1904, during the debate on the G.T.P. Bill.[14] Realizing that the Liberals were facing an election later that year, on 25 May, 1904, Sir William Mulock, the Postmaster General, tactfully shelved the matter by appointing a Royal Commission chaired by Judge John Winchester.[15]

In his report, submitted in January, 1905, Winchester found that, out of one hundred and one employees (as of 25 May, 1904), upwards of thirty percent were Americans. This contrasted sharply with Hays' claim that (on the basis of data supplied by Stephens)[16] ninety-seven percent of the employees in the G.T.P. survey parties were Canadians or British subjects, while only three percent were Americans.[17] More important, Winchester found that only one out of the nine senior management engineers was a Canadian.[18] While G.T.P. officials pleaded that they were forced to hire Americans because no qualified Canadians were available, Winchester's in-

investigations revealed that this was incorrect. In his concluding remarks, Judge Winchester stated that:

> ... there was no earnest endeavour made to obtain Canadian engineers for the location of the Grand Trunk Pacific Railway by those having authority to employ such, that had such an effort been made there would have been no difficulty in obtaining a sufficient number capable not only of locating but of constructing the whole work ... There was, however, a very earnest desire to obtain American engineers for the work, and in some cases applications were made to the heads of other railway companies to relieve men for the purpose of having them brought to Canada to be employed on this road.

In his final assessment, Judge Winchester concluded "that discrimination has been made, in my opinion, there is no doubt".[19] In accordance with his terms of reference, Judge Winchester reported on several American citizens, employed on the G.T.P., who came within the provisions of the Alien Labour Law.[20]

As well, Judge Winchester contended that one of the reasons why Stephens hired American engineers he knew was to shield his personal misconduct. A Winnipeg Police Constable testified, during the investigation, that he had picked up Stephens after he had fallen in an intoxicated condition in front of a hotel. On several other occasions, Stephens had also been observed by some of his subordinates to have been unable to attend to business, because of his intemperance.[21]

II

The G.T.P. case was not an isolated incident. Officially, the CSCE's response was similar to other incidents: aliens should not be discriminated against. In theory, an engineer's professional qualifications, not his nationality, should determine his employment in Canada, although, as a matter of principle, Canadians should be given preference when qualifications were equal. Because they were professionally competent and could compete successfully with Americans, the CSCE believed that Canadian engineers did not require protection. Even among the more articulate and outspoken CSCE members, there was little support for the principle of excluding alien engineers from Canada. Engineering, like science, it was assumed, was universal and transcended national boundaries.[22] "In the truest sense", declared Professor McLeod, "the engineer is a citizen of the world ..."[23] Engineering professionalism was based on scientific knowledge. Restrictions founded on national distinctions were antithetical to this concept; they placed political expedience ahead of science. The paramount consideration was professional qualification — not nationality;[24] "the man ... best fitted for the position, irrespective of nationality",[25] as one Canadian engineer, practicing in the United States, put it.

The engineering labour market, many of these engineers believed, was governed by the natural law of supply and demand. Competition among equals, unfettered by artificial bonds of nationality, invariably produced the best man and the best work, to the mutual benefit of the employer and the country.[26] National distinctions, however, inhibited the pursuit of professional excellence and encouraged second class work. Moreover, restricting alien engineers from Canada was considered to be unprofessional. It was often compared to trade unionism and was perceived as arbitrary intrusion into a free market which infringed upon an employer's right to obtain the best advice available.[27] More important, it would bring the profession and the CSCE into public disrepute. "I can conceive of no course", asserted Phelps Johnson, President of the CSCE and President of the Dominion Bridge Company, "so sure to discredit and disrupt the society as to adopt Labor Union methods and interfere in the disputes of engineers with their employers".[28] While engineers, as individuals, could claim preference on Canadian work, it would be improper for the CSCE to interfere between an employer and employee. As a learned society, the CSCE would only advise, not interfere with corporate bodies.[29]

Practical considerations also militated against restrictions. As a young developing country, Canada needed outside help, especially advanced engineering methods.[30] Americans did not discriminate against Canadians practising in the United States; the ASCE admitted all nationalities and even elected a Canadian, T.C. Keefer, as President.[31] Canada and the United States were too closely tied to erect artificial barriers. Restrictions would be unfriendly, ungentlemanly and would destroy the mutually advantageous, unofficial reciprocity between Canada and the United States in engineering talent. They would certainly invite retaliation. Moreover, many aliens were CSCE members, 241 resided in the United States by 1922.[32] The Society could not discriminate against its own members. If an alien engineer met the CSCE's admission requirements, he should be free to practise in Canada.[33]

The CSCE never disputed the fact that Canadian engineers were sometimes discriminated against. Rather than blame Americans, however, it first blamed those employers who hired Americans because they thought that they were superior. Ultimately, the CSCE blamed Canadian engineers who, it thought, lacked confidence and self assertion. As American engineers confidently promoted themselves, Canadians had not made their qualities known sufficiently to employers. In W.F. Tye's view, Canadians had been duped by American pretentions of superiority:

> ... if the Americans insist that they are the greatest engineers in the world, and we don't insist that we are equally good when the government want [sic] engineers it is natural for them to go there — to go to the people who say they are the greatest engineers.[34]

Thus, the problem was not so much legal as psychological. Rather than agitate for restrictions, Canadian engineers merely had to aggressively inform and re-educate employers. "[I]f we are given fair play", C.B. Smith maintained, "we don't need protection; our qualifications are sufficient ..."[35]

III

Although the CSCE was genuinely committed to an 'open-door' policy, it made one important, almost contradictory, exception; it was unalterably opposed to the employment of aliens on government projects, or works publicly subsidized (such as the G.T.P.),[36] when qualified Canadians were available. The employment of alien engineers by private companies, was not a source of complaint, since Canadian engineers never questioned the private property prerogatives of employers.

Of all the cases involving government appointment of alien engineers, no other case angered the CSCE as much as the employment of Professor George F. Swain, in 1916. Although Swain's appointment was not the most objectionable case of discrimination against Canadian engineers, it occurred at an awkward time and appeared to threaten some vital interests.

When the London money markets closed during the First World War, the ambitious Liberal railway building programme of the previous decade floundered and the two new transcontinental lines, the Grand Trunk Pacific and the Canadian Northern, were near collapse. In view of the political difficulties attached to continued public subsidization of the lines, in July 1916, Sir Robert Borden's government appointed a Royal Commission to study the whole vexatious railway problem. The Commission, under the Chairmanship of A.H. Smith, General Manager of the New York Central Railway,[37] immediately appointed an American engineer, Professor Swain of Harvard University,[38] to assist the inquiry in the valuation of railway property.[39]

Swain's appointment enraged the CSCE. On behalf of the Council, Professor McLeod issued a circular to all CSCE members, condemning the appointment on the grounds that alien engineers should not be appointed to a government enquiry.[40] According to McLeod, the inferences to be drawn from the incident were:

> 1st. That Canadian engineers who built the railways are not competent to report upon them.
> 2nd. That the Canadian Universities, in many cases enjoying government subsidies, are not producing competent engineers; and
> 3rd. That the Canadian Society of Civil Engineers, although embracing a membership of about three thousand, is not considered worthy of consultation on an important engineering question.[41]

In a deliberate attempt to influence government policy, the CSCE launched a vigorous campaign to protest Swain's appointment and to pressure the government into appointing Canadian engineers to all public bodies.[42] At the same time, the CSCE co-ordinated its protest with other interest groups.

During the First World War, Canadian architects, manufacturers and contractors resented the fact that some government contracts were awarded to foreigners. They felt discriminated against and warned that the employment of aliens had undesirable consequences. Since foreigners naturally preferred men and materials with which they were familiar, they usually specified foreign assistants and machinery.[43] The Contract Record argued that

> the employment of a United States architect or engineer is generally followed by the letting of the contract to a United States contractor, who, in turn, employs a United States staff and purchases in large measure, United States materials.[44]

Ultimately, Canadian money flowed out of the country. Recognizing that Canadian architects, engineers and contractors had a common interest,[45] the Toronto branch of the Canadian Manufacturers' Association called a meeting of interested businessmen and professionals late in 1916. This group later formed a committee and drafted a memorial to Sir Robert Borden.[46] Although the memorial was written to protest the awarding of the Lindsay Arsenal contract to foreigners, it expressed the CSCE's concerns about the employment of aliens on government works and, after some delays and misgivings, it was endorsed by Council.[47]

The CSCE's attempt to influence government policy represents a significant departure from previous actions. Prior to 1916, the CSCE was reluctant to criticize the government's employment policy, for fear of compromising its learned society status. Instead of demanding that Canadians be given preference on the G.T.P. surveys, for example, the CSCE merely advised the government that, for professional and technical reasons, it was in the interest of the country to hire Canadian engineers.[48] Thus, whether commenting on the G.T.P. surveys, or even Swain's appointment, the CSCE's representation to the government never varied; it was unnecessary to employ aliens, since qualified Canadian engineers were available. But after 1916, although the message remained the same, the CSCE's method changed.

For the first time, the CSCE attempted to press its case by a co-ordinated assault on Members of Parliament, the Press and Boards of Trade, in addition to marshalling its political influence with the government through its prominent members.[49] In short, it employed all the classic methods of interest group lobbying. "It would be difficult to imagine", Sir Henry Drayton, the only Canadian Commissioner on the railway enquiry, stated in a report to Prime Minister Borden, "a more complete ... attempt to achieve a result by political influence ..."[50]

Although the CSCE's campaign was neither effective nor particularly successful, it was remarkable because the CSCE chose to make a major issue out of an essentially weak case. The Canadian Engineer pointed out that compared to other more numerous and more serious cases on the municipal level, Professor Swain's appointment was not a particularly flagrant case of discrimination.[51] The appointment of A.H. Smith, it argued, was more serious, since Smith was the head of a rival American railway which controlled important railway interests in Canada.[52] Furthermore, it was doubtful that any Canadian engineer could have taken over Swain's job. Sir Henry Drayton offered the compelling argument that "all Canadian railway engineers of standing have been sometime or other, or are now in the employ of railway companies".[53] A Canadian engineer could not be reasonably expected to make impartial valuations of his own or rival railways.

As well, the CSCE had placed itself in the anomalous position of attacking one of its own principles: that, under exceptional circumstances, the service of an outside expert may be required for certain specialized work. In the absence of a truly impartial Canadian engineer, it was not unreasonable that a highly qualified expert of international standing — such as Professor Swain, the former President of the ASCE and member of the CSCE — should be appointed to study such a highly politically charged subject as Canada's railroads.

Under these circumstances, in the face of much worthier cases of discrimination, why did the CSCE attack the government? Part of the outburst over Professor Swain arose from nationalist fervour and professional pride; but other factors which threatened the engineers' livelihood also combined to produce the CSCE's shrill response to the appointment of Professor Swain.

IV

Like many other Canadians, engineers were caught up in wartime hysteria and patriotism. With nearly one third of the CSCE's members at the Front, Canadian engineers may have been less tolerant, perhaps a little resentful of Americans entering Canada and taking Canadian jobs, particularly at a time when the United States had not entered the War. As incidents of Canadians being passed over in favour of Americans grew more numerous and flagrant during the war, Canadian engineers became increasingly more sensitive. They began to lose a certain measure of balance and perspective and easily over-reacted to any instance of real or imagined discrimination. Professor Swain's appointment became the focus of much anger and frustration. It had enormous symbolic importance and was interpreted as an affront to Canadian engineers — especially the Montreal Clique — and a blow to the prestige of the CSCE.

Most Canadian engineers did not object to alien engineers moving north and making Canada their new home; but they resented American consulting engineers working in Canada on short term government contracts.[54] They argued that, while Canadian engineers in the United States had become American citizens and participated fully in the civil and professional life of their adopted country,[55] American consultants, by contrast, did not settle in Canada and, therefore, had no commitment to Canada. Their main interest in the country was monetary gain and this was not in the national interest. Protesting British Columbia's appointment of alien engineers under R.H. Thompson, an American engineer, in 1912, to survey Strathcona Park, R.W. McIntyre observed that, while Canadians paid taxes, supported families and spent their earnings in the province, "Mr. Thompson and his alien assistants owe no allegiance to Canada and the Empire and ... having no stake in the Country, are simply here for financial gain."[56]

Although most Canadian engineers conceded that a highly qualified American engineer might be employed temporarily in an advisory capacity under a Canadian engineer, for certain specialized work, there was no need to go outside the country to hire Americans, especially for routine work, since Canada had enough qualified engineers.[57] By virtue of their knowledge and experience with Canadian conditions and materials, Canadian engineers believed they were equal, perhaps superior to American engineers.[58] Engineering triumphs of international standing, as well as the success of Canadian engineers abroad, attested to their professional stature. Whether coping with sink holes north of Superior on the C.P.R.,[59] or installing generators at Niagara,[60] Canadian engineers believed that they possessed special native expertise. Alien engineers lacked this crucial advantage and this deficiency sometimes had calamitous results. "[T]he outstanding blunders in Canadian engineering work", the Canadian Engineer maintained, "... can be laid at the door of the man brought into Canada to report and then depart to be followed by his fee."[61]

Canadian engineers also assumed that an engineer required something more than technical competence to achieve professional excellence. He must have national commitment. Writing to Judge Winchester in connection with the G.T.P. survey investigation, Sir Sandford Fleming cautioned that, since Canada was embarking on a great national enterprise, it required "able upright engineers in full sympathy with our national aims and aspirations."[62] Perhaps remembering the Northern Pacific Railway's attempt to gain control of the C.P.R., Fleming warned that it was dangerous to hire aliens who might, as he stated, "come under the influence of those who would profit most by the non-success of the Canadian line ..."[63]

Beneath this concern for the national interest, however, lay a deeper anxiety about the ability of Canadian engineers to compete in the North American engineering labour market. Canadian engineers complained, for example, that there was no reciprocity between Canada and the United States in engineering talent. Although United States immigration officials interpreted the American Alien Labour Law in such a way as to admit members of recognized professions — including CSCE members[64] — many Canadian engineers believed that they did not have free access to American contracts and jobs. They argued that the U.S. Army Corps of Engineers was responsible for Federal government works and most state and municipal governments preferred American citizens. Even a growing number of private employers demanded American citizenship. Far more American engineers were employed in Canada than there were Canadians employed in the United States.[65] As an increasing number of Americans filled Canadian city engineerships and other government posts before the First World War, Canadian engineers realized that they were at a decided competitive disadvantage. Moreover, when governments passed over Canadians and hired Americans, Canadian engineers felt humiliated and stigmatized by an "inference of Canadian inferiority".[66] They contended that this damaged their professional reputation and set a bad precedent for private employers. Ultimately, it resulted in lost contracts and lost jobs.

More importantly, the main thrust of the agitation against the employment of alien engineers on public works came from the CSCE consulting engineers. They relied heavily on government contracts — especially municipal contracts — for a large portion of their practice. When funds for public works dried up, such as during the First World War, and many Canadian engineers were hard pressed for work,[67] American consulting engineers cut sharply into the profits of Canadian consulting engineering firms.

Although the protest against the employment of American engineers on government works was heated — especially in provinces furthest from Montreal like British Columbia — Canadian engineers did not blame Americans, nor manifest any anti-Americanism. They simply believed that Canadian governments should favour Canadians. This, they reasoned, was consistent with practice in other countries, particularly in the United States. Noting that all protests regarding alien engineers in British Columbia were confined to government funded works, C.E. Cartwright, a Vancouver consulting engineer, stated that there "is nothing to which American engineers can take exception in this as it is simply asking that our governments follow the example of the United States and all other nations".[68] Coming to the heart of the matter, Cartwright continued, "The protest is not against American engineers, but against the lack of knowledge of our own governments of the fact that qualified engineers can be obtained without sending abroad ..."[69]

V

On the surface, restricting alien engineers from employment on government funded works ran counter to the CSCE's professed free labour market policy. Restrictions, no matter how necessary and justified, were still founded on non-scientific grounds. This contradiction further undermined the CSCE's status as a learned society and generated more controversy over the Society's role and purpose.

For the most part, the 'open-door' policy was supported by older, more established engineers, associated with the Montreal Clique. Some engineers, like Phelps Johnson, for example, were American born and educated. As a management engineer, Johnson usually favoured large scale engineering immigration, to keep salaries down, and reacted negatively to any real or imagined infringement on management prerogatives, particularly in the area of labour relations. Still others, perhaps many others, had worked in the United States and were reluctant to jeopardize future employment, or alienate American colleagues and friends.

By 1914, however, these engineers realized that the climate of opinion regarding the employment of aliens had changed. It had become apparent that foreign competition hurt many CSCE members. Younger engineers, for example, were particularly affected; many were forced to leave Canada in search of work.[70] As well, prior to the war, editorial opinion in the technical press began to turn against the employment of aliens. In a long and carefully prepared editorial, entitled "The Foreign Invasion", published in May, 1910, the Canadian Engineer opposed the employment of alien engineers on the grounds that Canada no longer required outside help.[71] Later, in February, 1913, the Contract Record ignited a heated controversy by claiming that the "isolated few" 'open-door' supporters had international vested interests to protect.[72]

In spite of their opposition to labour restrictions, by 1916 the 'open-door' advocates were actively protesting the employment of alien engineers on government funded works. While they may have been influenced by the mounting opposition to aliens, the 'open-door' advocates undoubtedly realized that some restrictions could serve their business and professional interests. Opposing the employment of aliens on public works, for example, could lessen demands for legislation which might exclude all alien engineers from Canada. Such legislation could adversely affect the interests of Montreal's major private employers of engineers, such as the Dominion Bridge Company, or the C.P.R. Moreover, by simply urging governments to recognize the advantages of Canadian expertise and voluntarily employ Canadians, instead of enacting restrictions against aliens, the 'open-door' advocates technically avoided compromising their free labour market principles. In effect, they protected their interests by pursuing the apparently contradictory policy of advocating both restrictions and a free market.

This ambiguous policy was counter-productive. Virtually all the complaints about alien engineers originated from public works, especially on the municipal level. Restricting aliens from government funded works would effectively preclude most alien engineers from practising in Canada. This discredited the CSCE's 'open-door' policy and further eroded its facade as a learned society. At the same time, younger engineers and some consultants were angered by the CSCE's failure to protect them from foreign competition. They rejected the idea of requesting governments to voluntarily restrict aliens from public works and demanded mandatory restrictions to repel "The Foreign Invasion".

NOTES

[1] This Act restricted the entry of aliens as contract labour (see: 60-61 Vic., c. 11, s. 1). It was a reluctant response by the Laurier government to similar legislation in the United States. Robert Craig Brown and Ramsay Cook, Canada, 1896-1921: A Nation Transformed (Toronto, 1974) p. 120.

[2] During depressions, conditions in Canada were made worse by large numbers of American engineers who came north in search of work. In 1894, for example, Professor McLeod observed that "... Montreal has been over run this winter by engineers who have got out of employment in the United States during the financial depression ..." EIC Letter Books, Letter from McLeod, 22 Jan. 1894, p. 314.

[3] "The Royal Commission on the Alleged Employment of Aliens in Connection with the Surveys of the Proposed Grand Trunk Pacific Railway, Report of the Commissioner and Other Documents" in Canada, House of Commons, Sessional Papers (1905) No. 36a [hereafter cited: Winchester Report] pp. 6-13.

[4] "Minutes of Evidence", Ibid., p. 477.

[5] See the remarks of C.B. Smith, Ibid., p. 527.

[6] Ibid., p. 491.

[7] Winchester Report, pp. 15-29, passim. On Van Horne's practices, see: Pierre Berton, The Last Spike: The Great Railway, 1881-1885 (Toronto, 1971) pp. 94-97.

[8] Ibid., pp. 15, 46. Division engineer, G.A. Kyle, wrote several American engineers and offered them more money than their Canadian counterparts. Ibid., p. 58.

[9] This was in addition to a large number of applications for subordinate positions, such as levelers, topographers, transitmen and draughtsmen. Ibid., p. 6.

[10] Ibid., p. 37. Stephens and his assistants made virtually no attempt to employ Canadians. They did not advertise and made no serious enquiry of the CSCE, nor even the School of Practical Science, University of Toronto. "Minutes of Evidence", Ibid., pp. 86, 135, 511.

[11] Winchester Report, pp. 57, 48. Kyle also wrote to a number of American engineers offering positions at $175.00 per month, plus expenses, but a number of Canadian engineers were tendered only $150.00 and expenses. Ibid., p. 58.

[12] Ibid., p. 18. Kyle later resigned on the grounds of embarrassing the G.T.P. by exceeding his instructions in these letters. J. Castell Hopkins, Canadian Annual Review of Public Affairs (Toronto, 1904) p. 96.

[13] Council Minutes, 8 Oct. 1903, p. 273; 13 Oct. 1903, p. 299; 8 Dec. 1903, p. 295.

[14] See Canadian Annual Review, 1904, pp. 92-96.

[15] A prominent Toronto Liberal and County Court Judge, Winchester was appointed to a number of Royal Commissions and enquiries. J.J. Morgan, The Canadian Men and Women of the Time (Toronto, 1912) p. 1179.

[16] Winchester Report, p. 55. Stephens weighted his averages with non-engineering employees, Ibid., p. 58.

[17] Canada, House of Commons Debates, 1904, pp. 3029-3030.

[18] Winchester Report, pp. 38-57.

[19] Ibid., pp. 64-65.

[20] Ibid., pp. 5-6. Later, several engineers resigned voluntarily and warrants for deportation were issued for others. Debates (18 July, 1904) pp. 6884-6885.

[21] Winchester Report, pp. 53-55. On one occasion in Montreal, Winchester was forced to adjourn proceedings because Stephens was "not in a position to be examined". (Ibid., p. 55) Winchester was particularly angered with Stephens, since two of his Division Engineers, Kyle and George A. Knowlton, had dismissed staff for drunkenness.

[22] The clearest expression of this idea was given by a New York consulting engineer and CSCE member in a letter to the Contract Record, Rudolph Hering to Editor, Contract Record 27, n. 13 (26 Mar. 1913) pp. 44-45.

[23] McGill University Archives, C.H. McLeod Papers, Ass. 1101, Ref. 48, "Queen's 1907: The profession 1908" (Speech to the Engineering Society, Queen's University) n.p.

[24] Ibid., "Report of the Annual Meeting — Discussion", TRANS CSCE XXII (1908) pp. 38, 43. Ibid., XXIII (1909) p. 98.

[25] These remarks were by the city engineer of Ithaca, New York. Donald F. McLeod to Editor, Canadian Engineer 22 (8 Feb. 1912) p. 270.

[26] In the mind of one engineer, the Empire's Imperial greatness was the result of the "open-door policy" of free access of talent. "Report of the Annual Meeting — Discussion", (1909) pp. 116-117.

[27] If the CSCE used its influence to restrict aliens, according to W. Murdock "it would no longer be regarded as a technical organization for the promotion of scientific knowledge, but as a mere trades union. In such an event we should probably be invited to send delegates to the Trades and Labor Congress ..." W. Murdock to Editor, Contract Record 27 n. 10 (5 Mar. 1913) p. 67. Also see "Report of the Annual Meeting — Discussion" (1908) p. 42 (Remarks of G.H. Frost).

[28] "President's Address" (Phelps Johnson) Ibid. XXVIII (1914) p. 105.

[29] See Clipping Montreal Star, April, 1904, EIC Scrap Book No. 3; "President's Address" (Wm. Anderson) TRANS CSCE XIX (1905) pp. 23-24.

[30] McLeod, "Queen's 1907: The Profession 1908"; Edit. "The Work and Opportunities of the Canadian Society of Civil Engineers", Contract Record 28, n. 5 (4 Feb. 1914) p. 125.

[31] See remarks of G.H. Frost and W.J. Francis, "Report of the Annual Meeting — Discussion" (1908) pp. 41-42.

[32] Although some of these engineers may have been Canadian born, they constituted the largest single block of foreign engineers, holding CSCE membership. Engineering Institute of Canada, Charter, By-Laws, List of Members and Professional Engineering Acts, (Montreal, 1922) pp. 225-227.

[33] "Report of the Annual Meeting", (1908) p. 42; W.F. Tye to Editor, Contract Record 27 n. 9 (26 Feb. 1913) p. 40.

[34] W.F. Tye, "The Present Status of the Engineer in Canada", Ibid. 31 (11 Apr. 1917) p. 334.

[35] Winchester Report, "Minutes of Evidence", p. 527.

[36] Commenting on two heavily subsidized railways, the Canadian Northern and the G.T.P., the Canadian Engineer maintained that these companies "were not in a similar position to private corporations as they are operating for the public good under public franchise ..." (Edit. "Canadian Engineers" Canadian Engineer 21 [2 Nov. 1911] pp. 513-514). One prominent CSCE member from Ottawa believed that only CSCE members should be hired for all government and government assisted works. See, H. Victor Brayley to Editor, Contract Record 27, n. 9 (26 Feb. 1913) p. 41.

[37] The other members of the Commission were Sir Henry Drayton, Chairman of the Board of Railway Commissioners, Sir George Paish — who, because of illness was replaced by the British railway authority W. Acworth. Brown and Cook, Canada, 1896-1921, p. 244.

[38] Most of Swain's academic career, however, was spent at M.I.T. (for background, see: Robert Bothwell and William Kilbourn, C.D. Howe: a Biography, [Toronto,

1979] pp. 20-21). Swain was best known to Canadian engineers through his Presidential Address "The Engineer and the Social Problems", delivered at the Ottawa meeting of the ASCE in June, 1913. Edit., "The Engineer and the Community", Canadian Engineer 24 (26 June, 1913) p. 915.

[39] Swain, contrary to the CSCE's understanding, was not the Commission's advisor. His job was merely to conduct the physical valuation. EIC Scrap Book No. 6, Sir Henry Drayton to Sir Robert Borden, 19 Sept. 1916.

[40] Ibid., C.H. McLeod, "Circular", 7 Sept. 1916.

[41] Ibid.

[42] Ibid.

[43] See eg. edit. "The Canadian Municipality in its Contact with an American Engineering Firm", Canadian Engineer 19 (6 Oct. 1910) p. 452; Council Minutes, 17 Oct. 1916, p. 434. According to the Contract Record, when plans were prepared by an American architect or engineer, it was "almost a forgone conclusion that an American contractor will get the work ..." (Edit. "Foreign Plans for Canadian Work", Contract Record, 24, n. 32 [10 Aug. 1910] p. 35). Architects were angered that American plans could enter Canada and easily escape duty. They lobbied for heavy import duties. Edit. "Why do Foreign Plans Escape Duty", Ibid., 23, n. 6 (10 Feb. 1909) p. 29; Edit. "Foreign Plans for Canadian Work", Ibid., 24, n. 15 (13 Apr. 1910) p. 37; Edit. "Excluding Foreign Architects" 19 (1 Sept. 1910) no. 9, p. 253. For an American reaction, see Edit. "The Canadian Import Duty on Engineers' and Architects' Drawings", Engineering News LXI, (18 Mar. 1909) pp. 299-300.

[44] Edit. "The Persistent Practice of Employing Aliens", Contract Record, 32, n. 17, (24 Apr. 1918) p. 321.

[45] The Canadian Manufacturers' Association, for example, had previously said that it would support the architects' demand for a heavy import duty on plans, provided the architects specified only Canadian materials in their plans. Edit. "Excluding Foreign Architects", p. 253.

[46] CSCE, Toronto Branch Papers, Box #1, Minutes of Toronto Branch, 12 Oct. 1916, pp. 113-115; 16 Oct. 1916, pp. 115-116; *Ibid.*, Box #3, L.M. Arkley to C.H. McLeod, 14 Dec. 1916, edit., "The Persistent Practice of Employing Aliens", p. 321.

[47] Council Minutes, 24 Nov. 1916, p. 443; 14 Dec. 1916, pp. 448-449; 9 Dec. 1916, pp. 1-2; 17 Jan. 1917, p. 6. The President and Secretary of the Builders' Exchange and the President and Secretary of the Architects' Association of Quebec, also joined with the engineers and signed the Memorial (*Ibid.*, 20 Feb. 1917, p. 26). The *Canadian Engineer* later reported that the Cabinet was in general sympathy with the notion that Canadians should be given preference on Dominion public works. It also pointed out that the Memorial did not mention private, municipal or provincial contracts, since it was aimed chiefly at the award of the Lindsay Arsenal Contract to Westinghouse, Church, Kerr & Co. Edit., "Memorial to the Government", *Canadian Engineer* 34 (25 Apr. 1918) p. 357.

[48] McGill University Archives, C.H. McLeod Papers, Acc. 1101, Ref. 58, McLeod to Laurier, 24 Nov. 1903, EIC Scrap Book, no. 3, Clippings, *Montreal Star*, April, 1904. Moreover, the CSCE decided that "it was not desirable under any circumstances" to make any representations to the government as to the composition of the Quebec Bridge Commission (Council Minutes, 12 Dec. 1908, p. 253) and, beyond supplying basic information about a member's classification and record, the CSCE would not endorse or even recommend an engineer to the G.T.P. (*Ibid.*, 14 June, 1904, p. 322). Professor McLeod, almost to the point of being a hostile witness, stubbornly refused to even identify individual members of the CSCE who could have filled positions on the G.T.P. survey, to the Winchester inquiry. "Minutes of Evidence", *Winchester Report*, pp. 437-439.

[49] McLeod "Circular"; CSCE Toronto Branch Papers, MS 102, Box #3, McLeod to L.M. Arkley, 22 Sept. 1916; *Ibid.*, 28 Sept. 1916.

[50] EIC Scrap Book No. 6, Drayton to Borden, 19 Sept. 1916. The American Journal, *Engineering News*, viewed the CSCE's actions as a regretable mistake with regressive implications; an abandonment of the Society's professionalism. Edit. "Canadian Engineers Object to Appointment of Aliens", *Engineering News* LXXVI, Pt. II (12 Oct. 1916) p. 711.

[51] Edit. "Employment of Alien Engineers", Canadian Engineer 31 (28 Sept. 1916) p. 261. The appointment of Morris Knowles of Pittsburg to the Essex Public Utilities Commission was, according to this journal, "a most flagrant example of the way in which competent Canadian engineers are ignored and aliens appointed to lucrative positions that could well be kept at home". Edit. "The Appointment of Alien Engineers", Ibid., 31 (12 Oct. 1916) p. 303. Moreover, the problem was not confined to the Dominion Government, for every alien appointed by the Dominion Government, ten were hired by municipalities, according to the Canadian Engineer, Ibid.

[52] Ibid. Smith eventually submitted a minority report which took a stand against nationalization. The Contract Record rejected the Canadian Engineer's arguments. Edit. "Employing Alien Engineers", Contract Record, 30 (11 Oct. 1916) p. 973.

[53] EIC Scrap Book No. 6, Drayton to Borden, 19 Sept. 1916, "There are on the Council", Drayton reported, "two Canadian Pacific engineers, two Grand Trunk engineers, two Canadian Northern engineers, as well as engineers on the Intercolonial or National transcontinental system". Ibid. Even Professor McLeod was employed by the Grand Trunk Railway as time keeper, in his capacity as Superintendent of the McGill Observatory. "Minutes of Evidence", Winchester Report, p. 439.

[54] Edit. "The Employment of Engineers", Canadian Engineer, 22 (8 Feb. 1912) p. 269.

[55] Edit. "The Foreign Invasion", Ibid. 18 (20 May, 1910) p. 495.

[56] CSCE Toronto Branch Papers, MS 120, Box #2, R.W. MacIntyre to Richard McBride, 4 Oct. 1912. In spite of assurances from McBride that Thompson would hire British subjects as his engineering assistants, Thompson contravened the Premier's orders and hired American. Ibid.

[57] Conway, "Legislation and the Engineer", p. 109; Edit. "The Foreign Invasion", p. 496; Edit. "The Employment of Alien Engineers", p. 261.

[58] Edit. "Canadian Engineers on the G.T.P." Ibid. IX, p. 423; "Report of Annual Meeting", TRANS CSCE XIX (1905) p. 35. Also see remarks of W.T. Jennings and Sir Sandford Fleming in Winchester Report, p. 62. It was commonly believed by Canadian engineers that the designs of civil engineering works were governed by local climatic conditions, particularly ice, snow and frost, and that the conditions of transportation and supplies were different in Canada. Edit. "Employment of Engineers", Canadian Engineer p. 269; "Minutes of Evidence", Winchester Report, p. 427.

[59] For a colourful popular account of the rigours of railway building between Lake Superior and the Red River, see, Pierre Berton, The National Dream: The Great Railway, 1871-1881 (Toronto, 1970) pp. 282-289.

[60] See, Engineering Institute of Canada, Niagara Peninsula Branch, History of Engineering at Niagara (St. Catharines, 1977) chap. 4.

[61] Edit. "The Foreign Invasion", p. 496.

[62] Winchester Report, p. 63.

[63] "Minutes of Evidence", Ibid., p. 690.

[64] CSCE, Toronto Branch Papers, MS 102, Box #3. A.E. Jennings to Prof. Arkley, (27 Oct. 1910). Edit. "Employment of Alien Engineers", Canadian Engineer 31 (28 Sept. 1916) p. 261; "The Alien Labour Law and the Engineer", Engineering News LXI (22 Apr. 1909) p. 443. Considerable initial confusion existed about the status of the Canadian engineer in the United States and the CSCE was even prepared to track down any discrimination: EIC Letter Books, McLeod to Boswell, 31 Dec. 1892, p. 983; 25 Mar. 1893, p. 85; McLeod to the Canadian Architect and Builder, 15 Mar. 1893, p. 68; McLeod to Sir Casmir Gzowski, 23 Mar. 1893, p. 81; McLeod to W. Kerry, 23 Mar. 1893, p. 89; McLeod to J.S. Hodgson, 3 Apr. 1893, p. 94, 26 Oct. 1894, p. 536.

[65] "Minutes of Evidence", Winchester Report, p. 142; Edit. "Appointment of a Health Commissioner", Canadian Engineer 22 (16 May 1912) p. 609; G.R.G. Conway,

"Legislation and the Engineer", Ibid., 28 (7 Jan. 1915) p. 109; Edit. "Employment of Alien Engineers", Ibid., p. 261; "At the Country's Service", Contract Record 31 (May, 1917) p. 430; W.F. Tye, however, held a contrary view: "... there are many more Canadians holding good positions and drawing good salaries in the United States than there are Americans doing work in Canada ..." W.F. Tye to Editor, Contract Record, p. 40.

[66] "Form of Memorial to the Rt. Hon. Sir Robert L. Borden and to the Members of the Dominion Government concerning the employment of Alien Architects, Engineers and contractors on large Public Works in Canada", Public Archives of Ontario, MS Misc. Col. Box 1 #57, n.d., n.p. R.W. MacIntyre detected a "stigma of unworthiness" attached to the whole business and stated that it was "a tendency which casts very serious reflection and reproach on our engineers and is diametrically opposed to the doctrines of anti-reciprocity and imperialism". CSCE, Toronto Branch Papers, MS 102, Box #2, R.W. MacIntyre to Richard McBride, 4 Oct. 1912.

[67] Edit. "Appointment of Alien Engineers", p. 303.

[68] C.E. Cartwright to Editor, Contract Record 27, n. 13 (26 Mar. 1913) p. 46.

[69] Ibid.

[70] See eg.: "Report of Annual Meeting — Discussion", (1909) pp. 98-99, 117.

[71] Edit. "The Foreign Invasion", pp. 495-496.

[72] Edit. "Work and Status of the Canadian Society of Civil Engineers", Contract Record 28, n. 9 (26 Feb. 1913) pp. 37-38.

Chapter V

"THE MOST INIQUITOUS AND IMPERTINENT PIECE OF LEGISLATION" THE CSCE AND THE POLITICS OF PROFESSIONALISM

Toward the end of the nineteenth century, CSCE members tried to solve the problem of foreign competition and achieve professional standing by legislation. In 1896, the CSCE began seeking restrictive licensing laws to close the profession to 'unqualified' practitioners. This tactic had been attempted before. In 1881, an engineering licensing law was introduced into the Ontario Legislature[1] and, in 1887, Alan Macdougall endeavoured to have the CSCE incorporated as the licensing and regulatory body for Canadian engineers.[2] Although the legal profession had been self-governing for over a hundred years[3] and the world's first dental act was passed in Ontario in 1868,[4] licensing was a comparatively novel and extraordinary measure for an era that still extolled the virtues of *laissez faire*. Moreover, as a predominantly "civil" engineering society, the CSCE's licensing programme soon encountered fierce opposition that persisted until well past the First World War.

I

Although Canadian engineers deeply resented competition from alien engineers, they clearly regarded land surveyors as the greater threat. The problem was that surveyors often practised civil engineering and usually called themselves "civil engineers".[5] While engineers were confident that they could compete with surveyors on an equal basis, they believed that surveyors' licensing laws gave them an unfair competitive advantage.

Land surveyors had always enjoyed special privileges. Originally, boundary lines were set by government officials, usually military engineers and surveyors, but this responsibility was gradually delegated to private surveyors, who functioned as public officials. Surveyors were expected to uphold the public interest by protecting third parties, such as landowners whose property adjoined lands surveyed, and to be familiar with complex land laws and systems of measurement.[6] In the interest of accuracy and impartiality, governments reserved the right to examine, license and to regulate surveyors.[7] By the late nineteenth and early twentieth centuries, these powers were conferred on provincial land surveyors' societies.[8] This gave surveyors extraordinary power to control all aspects of professional practice; in effect, a monopoly similar to that enjoyed by lawyers and doctors.

Engineers were excluded from surveying, but surveyors, whether competent or not, could practise engineering.[9] Engineers were also excluded from some aspects of traditional engineering practice by other laws favouring surveyors. Under the Northwest Irrigation Act, 1894, for example, only Dominion Land Surveyors (who had exclusive rights to survey Dominion lands) could sign maps and plans.[10] Employers, unable to afford both surveyors and engineers, were forced to engage surveyors. Gradually, government and Canadian Pacific Railway work, in the North-West, was taken over by Dominion Land Surveyors. This caused friction between engineers and surveyors. Engineers not only felt at a severe competitive disadvantage, but also felt discriminated against. "We are", protested one irate engineer, "actually being crowded out by legal enactments from a fair chance to secure employment except as assistants to Dominion Land Surveyors on purely Engineering works ..."[11] During the depression of the 1890's, as immigration to the North-West declined, engineers believed that unemployed surveyors were drifting into civil engineering, in competition with engineers who were already hard pressed for work. At this point, some engineers began to suggest that the only solution to their problem was to imitate the surveyors: restrict competition by closing the profession to 'unqualified' practitioners.[12]

II

By 1892, many CSCE members favoured restricting competition by licensing. Following the completion of the CPR, the demand for engineers declined and younger ones believed that licensing would eliminate competition from aliens, surveyors and non-professionals. This would increase demand, create employment and help to stem the flow of recent engineering school graduates to the United States. Government engineers recognized that licensing might help to eliminate patronage and give them professional standing.

While the Montreal Clique rejected licensing, they did not vigorously oppose it. They undoubtedly recognized that during the 1890's the weight of opinion, particularly among a growing number of prominent engineers, had dramatically shifted in favour of political action. Voicing perfunctory objections, the Montreal Clique was forced to yield, temporarily, to majority opinion.[13] It was not until the First World War that they raised strong philosophical objections.

The CSCE's independent consulting engineers had the most to gain from licensing. Unlike most CSCE members, who were salaried employees and thus partly shielded by corporate employers from outside competition, consulting engineers were directly affected by competition from aliens and surveyors, especially during the 1890's depression. However, while they were hurt by competition, consultants rarely complained of real hardship. Had they seriously wanted access to surveying, they could easily have passed the surveyors' licensing examinations. Many, especially city engineers, were licensed Provincial Land Surveyors by necessity.[14] In many respects, the surveyors' monopoly appeared to have injured their professional pride, not their pocketbooks. Consultants did not consider surveyors to be their equals. It was demeaning, not financially ruinous, to be compelled to join their guild, in order to practise some traditional aspects of engineering. Other more compelling reasons inspired licensing.

As Canada moved deeper into the depression of the 1890's, a growing number of consultants competed for a decreasing number of contracts. In the "scramble for work",[15] as the Canadian Engineer described it, consulting engineers engaged in competitive practices that were considered unethical by contemporary legal and medical standards. Underbidding, advertising, lobbying and giving gratuitous professional advice, were prevalent and sometimes the subjects of controversies in newspapers.[16] As well, consultants were forced to compete with salaried engineers. It was a common practice for engineering professors (and even some government engineers) to accept outside consulting work. At a time when contracts were scarce, consultants charged that government engineers and, especially, professors had an unfair competitive advantage. They had secure incomes and free use of publically endowed facilities, such as university laboratories. Consultants complained bitterly that they had to provide their own facilities.[17] Although the CSCE had had a Code of Ethics since 1896, unethical practices continued.[18] The Code was ineffective and unenforceable. It applied only to CSCE members, ignored the engineer's quasi business mentality and, most significantly, did not specifically prohibit unseemly competitive practices. Predicated on the ethical imperatives of the "Golden Rule",[19] it merely set forth broad guidelines for professional conduct. CSCE members, asserted President John Kennedy in 1893, were men of honour, "who merely stand in need of guidance and not of restraint ..."[20] Thus, instead of regulating competition, the Code served as a kind of gentleman's code of honour, which enhanced the CSCE's prestige, but did little to improve its ethics.

The consultants recognized that the CSCE must acquire licensing powers to enforce a code of ethics and to regulate competition. To this end, they first appealed directly to members' sense of professional pride. Unseemly competition, they argued, harmed the profession by lowering its status. "As the profession stands today", Macdougall stated, "it is almost a trade".[21]

A more successful tactic, however, was to arouse members' anger over the problem of land surveyors encroaching on engineers' prerogatives. Macdougall and other consultants used this issue as a pretext to agitate for licensing laws. They were responsible for subtly promoting the idea that laws favouring surveyors discriminated against engineers. This enabled them to portray licensing as a pragmatic defensive measure which, in turn, temporarily neutralized the Montreal Clique's opposition.

III

Although Macdougall failed to have the CSCE incorporated as a self-governing licensing and regulatory body in 1887, he did not abandon the idea, in spite of strong opposition from the Montreal Clique. Encouraged by a growing demand within the CSCE for legal recognition, he rallied his forces and organized a powerful crusade to place engineering on the same legal footing as law and medicine.

In April, 1892, Macdougall launched his campaign at a regular Montreal CSCE meeting. In a paper entitled: "The Professional Status: A Plea for a Close Corporation", he argued that a close corporation (the popular term for an incorporated professional society closed to non-professionals) was a natural and necessary development in establishing engineering as a profession.[22]

Macdougall's views were soon endorsed by the Toronto and other branches, but a request that Council take action to secure licensing legislation was turned down, on the grounds that it was not then feasible.[23] Undaunted, Macdougall circumvented the Montreal Clique and appealed directly to the membership. At the 1893 Annual Meeting, a Committee on Professional Status was appointed with Macdougall as its chairman.[24] For the next two years, however, Macdougall's initiative faltered and lost momentum. With committee members scattered across Canada, committee business was conducted awkwardly by correspondence; Macdougall assumed most of the workload. The committee made little progress until 1895, when, in response to its circular, the committee members approved of creating a close corporation. In October, Council authorized the committee to retain legal counsel to draft bills of incorporation.[25]

Macdougall knew exactly what he wanted: licensing, not government regulation or certification, privileges similar to those enjoyed by the Ontario Association of Stationary Engineers or the Institute of Chartered Accountants of Ontario.[26] Nothing less than the full powers possessed by the Law Society of Upper Canada, for example, would do.[27] But, while this organization was an ideal example of a close corporation, the recently incorporated Ontario Association of Land Surveyors (OALS) appeared to be Macdougall's practical model. Like the

OALS, he believed that the CSCE should have full self-governing powers to regulate all aspects of professional practice — administration, admission, discipline.[28]

Macdougall also thought that the CSCE, although a private organization, should be incorporated as the licensing and regulatory authority.[29] CSCE leaders had always assumed that their Society was, as one memorandum stated, "the representative body for Canadian engineers of all branches",[30] which, comprised practically all the professionally qualified engineers in Canada. Like the ASCE, the CSCE claimed to represent all non-military, or 'civil' engineers, including mining engineers, which it considered, at least theoretically, a "sub-department of civil engineering".[31] This claim, however, was not based on actual membership; the CSCE was aware that, while it was Canada's only federally incorporated engineering society before 1898, it was still essentially a 'civil' engineering society with its membership concentrated in Quebec and Ontario. Rather, the CSCE claimed to represent 'professionally qualified' engineers, or all scientifically trained men who could design and construct and had ten years experience, five in responsible charge. These standards, the CSCE contended, were internationally recognized by the world's leading national engineering societies — ICE, ASCE.[32] Measured against these standards, other Canadian engineering societies were not considered professional and those unable to qualify for CSCE membership were believed to be unfit to practise. Thus, Macdougall assumed that it was only reasonable that the CSCE, like the OALS, should be given licensing and regulatory powers.

Unfortunately, Macdougall's licensing scheme had two major problems. First, under the CSCE's Dominion charter, it was only empowered to "facilitate the acquirement and interchange of professional knowledge among its members". It could acquire property, elect officers and pass by-laws; but, like the ICE, it had no authority to reconstitute itself as a close corporation. The second problem was related to the first. Although engineering was practised nationally and the CSCE had a Dominion charter, only the provinces could confer licensing powers. Under the British North America Act, professional societies were regarded as educational bodies. While Macdougall preferred Dominion incorporation,[33] he understood the legal problems and accepted a solution proposed by the Society's lawyers: the Society should obtain an amendment to its Dominion charter, while applying for incorporation in each province with a standardized act.[34] With some difficulty, the lawyers drafted the legislation and Council sent confidential copies to senior CSCE members.

Of the two draft bills, the Dominion one was simpler, but potentially more important. Framed along lines suggested by Walter Shanly,[35] it proposed to restrict all Dominion and publically subsidized engineering works to CSCE members.[36] On the surface, this bill appears to have been inspired by the Dominion Lands Act which granted Dominion Land Surveyors exclusive surveying privileges on Dominion lands. However, while the Dominion Land Surveyors' powers were strictly proscribed by statute, a simple amendment to the CSCE charter would give engineers wide ranging monopolistic powers over all aspects of government engineering and publically subsidized works, including, presumably, many railways. This would restrict competition from aliens, surveyors and non-professionals and expand employment opportunities, especially for consultants. It would also deprive the government of an important source of patronage.

The draft provincial bill attracted more attention. Modelled after other Canadian licensing laws, it proposed to incorporate a separate, self-governing licensing and regulatory society, with power to restrict the use of the title "Civil Engineer", as well as restricting access to any provincial or provincially subsidized works.[37] Although Macdougall wanted greater powers, he rationalized that it was a good beginning; amendments could follow later. Other engineers, however, were more critical. Unlike lawyers and doctors, they argued, engineers were, of necessity, constantly moving. The proposed bill, they claimed, would restrict mobility by forcing engineers to belong to seven separate provincial societies.[38] In defence, Macdougall explained that provincial barriers could be overcome by passing a standardized act in each province and, since the bill was framed in very general terms, provincial councils would have wide powers to make adjustments to ensure national uniformity.

In spite of these misgivings, the provincial bill was approved by a large majority of the members attending the CSCE's 1896 Annual Meeting. Council was authorized to apply to Parliament for an amendment to the charter; Macdougall's committee was dissolved and replaced by a Central Committee of five and several provincial committees of three.[39] Although some members, such as C.E.W. Dodwell, thought that it would be "practically impossible"[40] to get the proposed bill passed, especially before the Dominion charter was amended, the Manitoba Committee acted with such dispatch that the Legislature passed the bill almost without changes. It became law the first of July, 1896. According to the Engineering News of New York, Manitoba became the first government in the world to make engineering a close profession.[41]

Meanwhile, acting on instructions from the membership, Council appointed a sub-committee to study the feasibility of amending the Dominion charter. But, after two trips to Ottawa, the committee concluded that it was unadvisable, at that time, to seek the amendment.[42] The bill was set aside and never introduced. The CSCE then turned its attention to the provincial legislatures.

In Quebec, the government accepted and introduced a revised CSCE bill as a government measure. Unlike the Manitoba bill, it did not propose the incorporation of a separate provincial governing body. Acting on the advice of the Society's Quebec lawyer, the CSCE accepted the idea that the provincial government should merely recognize the Dominion charter and grant the Society special regulatory powers in Quebec. It was believed that this would help to preserve the CSCE's unity by avoiding the creation of autonomous provincial societies.[43] As well, to prevent discrimination, the revised bill stipulated that new members should be admitted by examination, not election. Unfortunately, the bill was introduced late in the session and died when the Legislative Assembly prorogued.

It is ironic that the bill's only real opposition came from within the CSCE. At the 1897 Annual Meeting, some members charged that the bill was killed because an unnamed CSCE member complained to the Attorney General.[44] As well, W.J. Sproule, an energetic supporter of the bill, stated later that some councillors were passively resisting the bill by needlessly delaying its reintroduction.[45] It was at this point, when Sproule despaired of seeing the bill passed that session, that Professor McLeod took charge and saw the bill through the Legislature. Anticipating trouble from the Quebec Mining Society, McLeod moved quickly to forestall opposition by simply exempting mining engineers from the legislation.[46] As well, recognizing that Quebec Provincial Land Surveyors were, as he put it, "very strong politically",[47] McLeod neutralized potential opposition by including them in the bill.[48] Most Quebec surveyors, he reasoned, were engaged in some form of civil engineering and nearly a third of their ranks were already CSCE members.[49] They could not be excluded.

The Quebec bill finally became law on 15 January, 1898. Securing its passage had been difficult, time consuming and expensive; yet, its enactment represented a major achievement for the CSCE. Twenty years would pass before a provincial legislature would pass another licensing law.

IV

Encouraged by their success in Quebec, the CSCE quickly introduced similar bills in Nova Scotia and Ontario. But, unlike the Manitoba and Quebec legislation, these bills immediately encountered fierce and well organized opposition from mining and other non-civil engineers who saw the legislation as a direct threat to their interests. In spite of the CSCE's willingness to compromise and overcome objections, opposition persisted, grew stronger and eventually destroyed the CSCE's legislative campaign in other provinces.

Mining engineers resented the prospect of being forced to join the CSCE to practise. "We don't want to be forced into any kind of societies in order to make a living ..."[50] protested one irate mining engineer. The CSCE neither represented mining engineers, nor was competent to judge their qualifications. According to B.T.A. Bell, the energetic and forceful young editor of the Canadian Mining Review who became the CMI's Secretary, the Nova Scotia bill was, in his words, "the most iniquitous and impertinent piece of legislation"[51] he had ever seen. It did not, he believed, represent the true sentiments of most CSCE members. It was the work of an arrogant and egotistical coterie in Montreal. Moreover, the CSCE's high compulsory membership fee (described by John Hardman, the CMI's first president, as a "tax")[52] was a desperate attempt to increase the revenues of a dying society.[53]

The Dominion Institute of Amalgamated Engineering (DIAE), a large engineering society claiming to represent civil, as well as other engineers, and organized the same year the CMI was incorporated (1898),[54] argued that the Ontario legislation would grant monopoly powers to a small private interest group.[55] This view was supported by newspapers in Halifax, Kingston and Toronto. The authority to regulate all aspects of professional practice, the DIAE contended, would lead to abuse and threaten the legitimate interests of students, tradesmen and non-civil engineers. Engineering in Great Britain and the United States, it noted, was an 'open' profession. Restrictive licensing laws to protect the public from unqualified engineers were unnecessary because, unlike doctors and lawyers, engineers did not deal directly with an unsuspecting public. Their employers — railways and governments — were sophisticated organizations and could protect themselves from imposters and incompetents.[56]

At the heart of this criticism was the conviction that the CSCE bills would constitute unfair competition. While the DIAE and CMI approved of the need to protect the public from unqualified practitioners, they were enraged by the prospect of a monopoly being conferred on their rivals. In their view, the CSCE legislation was simply a brazen and cynical attempt to eliminate competition. Professor R. Carr-Harris, Queen's University, the

CSCE's fiercest critic, warned the CMI that the bills were, as he declared, "simply nothing more or less than an attempt to sweep out of existence any competition with ... [CSCE] members ..."[57] Other critics denounced the bills as "class legislation" and accused the CSCE of forming an engineering "trust", on the pretext of protecting the public.[58] This, in their judgment, was undemocratic and an affront to liberal *laissez faire* values. Professor Carr-Harris advised the CMI not to make any compromise with the CSCE. He warned that the bills were merely the "thin edge of the wedge",[59] part of a larger movement to obtain restrictive legislation throughout the Dominion. Adopting a common DIAE polemic, one Halifax newspaper saw grander and more sinister designs. The CSCE's legislative scheme, it declared, was "a well planned and persistent movement to control the whole of the vast and intricate series of engineering operations in Canada from a little office in Montreal".[60] The CSCE must be stopped.

In 1899 and 1902, Bell and Carr-Harris argued forcefully against the CSCE's bills before the Private Bills Committee of the Ontario Legislature. In 1902, Sandford Fleming, then Chancellor of Queen's University and a DIAE member, publically condemned the 1902 bill as being "repugnant to the spirit of Canada".[61] Principal Grant of Queen's; W.L. Goodwin, Director of the School of Mines, Kingston; as well as faculty and student representatives from Queen's, also lobbied against the Ontario bill, with the result that it did not survive for second reading.[62]

Dismayed at first by this opposition, the CSCE responded pragmatically and moved quickly to accommodate critics. Adopting the same tactics employed a year earlier in Quebec, the CSCE approached the OALS. Regarding their co-operation as essential, the CSCE offered to admit OALS members to associate (not full) membership, on the grounds that many Ontario surveyors were also CSCE members. After some further concessions concerning membership fees, the OALS approved the 1899 Ontario bill and only a few surveyors, acting as private individuals, opposed the bill. Apart from some misgivings about the 1902 bill, the CSCE experienced no further opposition from surveyors.[63]

Accommodating the CMI, however, proved more difficult. Beginning in 1899, McLeod wrote conciliatory letters to Bell and Carr-Harris, conveying the Society's good intentions and reassuring them that the CSCE had no desire to interfere with their rights and privileges. McLeod and other councillors met CMI officers and offered to exempt all mining engineers and managers from the bill. Although McLeod believed that he had made some progress in modifying the CMI's attitude, he was genuinely bewildered by their continued opposition. The blanket exemption, he thought, was a major concession. It had been acceptable to Quebec mining engineers in 1897.[64] After years of hard work, frustration and bitter disappointment over the Ontario bill, McLeod gradually began to suspect that other factors were involved. Finding no rational explanation for the CMI's opposition, he and other councillors concluded that it was the result of a "misunderstanding"; mining engineers and, especially, the public, had been badly misinformed about the bill.[65] McLeod also tended to reduce the problem to personalities and privately hurled some ill-tempered invective at CMI leaders. In 1900, for example, he declared that mining engineers were being "manipulated" by men such as Bell and, in 1902, charged that Queen's University (or, more precisely, Carr-Harris) was behind the CMI's continued opposition. McLeod questioned Carr-Harris' competence as an engineering professor and accused him of misleading Queen's engineering students about the CSCE's bill.[66] Blinded by his contempt for Carr-Harris, McLeod believed that his opposition to the CSCE was, as he revealed confidentially to a colleague, "founded upon personal animosity".[67]

There is some evidence to suggest that Carr-Harris was inaccurate, if not deliberately misleading in some aspects of his critique of the CSCE's bill. There was also considerable public misunderstanding. The bill was a novel and extraordinary expedient for its time and even some CSCE members were confused. However, much of the misinformation was of a minor nature. Preoccupied with the superficial aspects of their opponents' criticism, the CSCE failed to probe and to comprehend its significance. They seemed insensitive to, and largely ignorant of, the bill's wide ranging implications. For example, they never fully appreciated that, in spite of their attempt to protect the rights of mining engineers, the bill still threatened some important vested interests. Although mining engineers were exempted from the proposed legislation, their rights were still not fully protected.[68] Traditionally, mining engineers encompassed many branches of engineering: mechanical, electrical, as well as civil. Under the Ontario bill, for instance, only CSCE members could legally design and construct mine roads and railways.[69] Similarly, some 'practical' engineers and tradesmen were also threatened. Small municipalities, unable to afford a township or county engineer, contracted local "practical" men for public works. Enactment of the CSCE's bill would immediately deprive these men of their livelihood because, lacking scientific training, they could not become CSCE members and qualify as licensed engineers.[70]

At the same time, other important interests felt threatened. Although the University of Toronto approved of the CSCE's 1902 bill, it seems clear that Queen's University and, probably, the School of Mines, feared that, if the bill became law, the CSCE could control university engineering education by virtue of its power to recognize degrees and set admission standards. As well, if CSCE membership were compulsory, membership in the voluntary societies — CMI, DIAE — would decline, because most engineers would not pay double dues. This prospect frightened the CMI. It confirmed an old suspicion that the CSCE had been scheming to take over their society.[71] The CMI was also deeply concerned that foreigners might not invest in the Canadian mining industry if their trusted technical advisors were barred from practising in Canada because of licensing restrictions.[72] This might deprive the Canadian mining industry of investment and, thus, deny Canadian mining engineers work. After 1918, this point would become central to the CMI's case against engineering licensing laws.

Another major indication of the CSCE's insensitivity was their approach to admissions in the 1902 bill. Unlike the 1899 bill, this one had no statutory provision for an examination board to admit engineers to membership. The legislation simply validated the CSCE's by-laws which, in turn, governed qualifications and admissions. Under these regulations, candidates were admitted by letter ballot — if ten percent of the vote cast was not negative. To outsiders, however, this provision appeared arbitrary. Dr. Goodwin, for example, characterized it as medieval,[73] while the Toronto Globe called attention to the potential for abuse arising from granting undisclosed powers to a private interest group.[74]

It is not clear why the examination board was dropped from the 1902 bill. CSCE members, at least in Quebec, recognized the serious implications of admission by election. As early as 1896, members of the Quebec Provincial Committee on Legislation argued that the exclusion of a candidate from membership by a potential ten percent negative vote because of professional jealousy or, perhaps, personal dislike, would be a "manifest injustice"[75] because it would deprive a man of his livelihood. They warned that it would also constitute a major impediment to a bill's enactment.[76] Perhaps organizers felt that an examination board was unnecessary. Admission by election was an accepted and well established procedure employed by leading national engineering societies. The members of Canada's only representative national society of professionally qualified engineers may have felt quite capable of judging a colleague's professional qualifications without formal examination. Moreover, older more conservative engineers, who were hostile to university engineering education, undoubtedly believed that experience was the only true measure of engineering ability; anyone could master theory and pass an examination. Nevertheless, the deletion of the examination board, combined with the threat to important vested interests, had serious consequences; it discredited the CSCE and made it appear elitist and self-serving. This virtually guaranteed the unflagging opposition of non-civil engineers and created such a legacy of bitterness and suspicion that civil engineers in Ontario were not granted full licensing powers until 1937.[77]

The CSCE's handling of its licensing bills was awkward, high handed and politically inept. Never again would it attempt to establish itself as the governing licensing body. This was the main lesson the Society learned during this period. In the meantime, since Council viewed legislative success in Ontario as an essential preliminary to obtaining similar legislation in the West and Maritimes,[78] the defeat of the 1902 Ontario bill effectively terminated the first phase of the CSCE's legislative programme, in spite of a later attempt to secure legislation in 1907.

V

By 1914, the CSCE had obtained legislation only in Manitoba and Quebec. Unfortunately, these Acts had serious limitations. The Manitoba Act did not have a penalty clause. According to Professor McLeod, it was passed "in a very great hurry",[79] before Council realized its absence. The Society's lawyer earlier had advised that its omission would be "politic" and suggested that a penalty clause could be obtained later through an amendment.[80] Although H.N. Rutan, City Engineer, Winnipeg, defended the Act on the grounds that it at least had the moral force of law, nevertheless, without a penalty clause it amounted to little more than a mild registration law and the American engineering press charged correctly that the Act was unworkable. Attempts to amend it were postponed pending the passage of licensing laws in other provinces.[81] By contrast, the Quebec Act had a penalty clause; but, the Council was reluctant to have the Law enforced, for fear of jeopardizing licensing legislation in other provinces.[82] Although Professor McLeod characterized the Quebec Act as "very stringent", unenforced it was worthless and McLeod concluded that its main effect was to inform the public about the engineer's high educational qualifications.[83]

By 1902, the campaign to close the profession was already in sharp decline. Macdougall's death in April, 1897, deprived the movement of momentum and enthusiasm. McLeod was able and persistent, but Macdougall had the talent and determination to unite and to inspire engineers with a vision of greater power and prestige. After his death, consulting engineers, like Willis Chipman, could not mobilize the full support of the mass of ordinary salaried engineers.[84] After 1904, as employment opportunities increased and competition among consultants eased with the building of the transcontinental railroads, the demand for protective legislation declined.[85]

During this period, rather than vainly pursuing legislation, the CSCE became more concerned with protecting its existing privileges. Unable to monopolize engineering practice by licensing, it then attempted to monopolize the title "engineer" by opposing the incorporation of 'non-professional' engineering societies. In 1903, for example, the CSCE lobbied the Dominion Government and blocked the incorporation of its old nemesis, the DIAE.[86] At the same time, the CSCE also carefully monitored Dominion and provincial legislatures for bills which might encroach on traditional engineering prerogatives. It was particularly vigilant with respect to legislation concerning land surveyors. By 1910, amid growing demands from angry Quebec members to enforce the Quebec Act against aliens practising illegally in the province,[87] the Council began to systematically notify offenders and their employers of violations. It also explored the possibility of a test case and retained lawyers to scrutinize private bills admitting unqualified engineers to practice.[88]

Although these initiatives appear inconsequential, in contrast to earlier attempts to close the profession, they kept the CSCE politically active and served as a necessary prelude to the next attempt to obtain restrictive licensing laws, after 1918. In the meantime, with the completion of the transcontinental railways and the onset of the 1913 depression, younger salaried engineers grew progressively more dissatisfied with the CSCE's failure to solve their economic problems. During the war, they began to raise serious questions about the CSCE's structure and purpose.

NOTES

[1] This bill called for a full measure of professional self-government, with complete statutory authority to control and regulate all aspects of professional practice by a board of engineers, appointed by the Crown from a list of fourteen prominent engineers (listed apparently without the knowledge or consent of those named). Introduced as a private bill, it received little support and was thrown out upon second reading. (See: Public Archives of Ontario RG 8 1-7-H, "An Act Respecting Civil Engineers"; "President's Address" [T.C. Keefer], *Transactions of the Canadian Society of Civil Engineers* [hereafter cited: *Trans CSCE*] II [1888] pp. 11-13). The author of this bill is unknown. T.C. Keefer speculated that it was "suggested by" E.W. Plunkett's May, 1880, circular. (*Ibid*. See Chapter II, p. 70). It is possible that J.L.P. O'Hanely, a charter member of the CSCE, may be the author. In a reminiscence, he claimed to have drafted a bill for the Ontario Legislature which, in many respects, resembles the 1881 bill; *cf* Public Archives of Canada, J.L.P. O'Hanely Papers, MG 29 B11, Vol.II, "Preface: The Ottawa Revelations — Civil Engineering", p. 168.

[2] See Chapter II, pp. 44-45.

[3] For a concise analysis of the development of the regulation of the legal profession in Ontario, see: Appendix B to the Research Directorate's Staff Study, "History and Organization of the Legal Profession in Ontario" (1978), prepared for the Professional Organizations Committee, Ministry of the Attorney General, Ontario, pp. 1-20.

[4] D.W. Gullett, *A History of Dentistry in Canada*, (Toronto, 1971) pp. 43, 283-286.

[5] EIC Scrapbooks, No. 1, Alan Macdougall, "Draft Report of the Committee on Professional Status", 10 Oct. 1893.

[6] *Ibid.*, "Committee on Professional Status and Close Corporation", n.d.: "Discussion on a Plea for a Close Corporation", *Trans CSCE* VI (1892) pp. 116-119;

"Report of Annual Meeting", Ibid., X (1896) p. 12; Elizabeth Fisher, "Professional Associations in Canada", (unpublished Ph.D. dissertation, University of Toronto, 1932) p. 184.

[7] As early as 1849, for example, An Act to Repeal Certain Acts Therein Mentioned and to Make Better Provision Respecting the Admission of Land Surveyors and the Survey of Lands in This Province (Provincial Statutes of Canada, 12 Vict., c. 35) set out the provisions for the qualification and examination of land surveyors.

[8] See eg., W.C. Yates, "Historical Review of the Association of Ontario Land Surveyors", Association of Ontario Land Surveyors, Annual Report 82 (1967) pp. 149-153.

[9] See Keefer's remarks: "President's Address", Trans CSCE, p. 10. Engineering was an 'open' profession; anyone could practise regardless of their qualifications. Moreover, engineers had no legal status. They could not collect or sue for fees. The only recourse against an engineer was a civil action in negligence. Macdougall, "Draft Report of the Committee on Professional Status"; EIC Scrap Book No. 1, "Memorandum for the use of the Provincial Committee on Incorporation", 3 July, 1897; Appendix D to the Research Directorate's Staff Study, "The History and Organization of the Engineering Profession in Ontario", (1978) prepared for the Professional Organizations Committee, Ministry of the Attorney General, Ontario, p. 2.

[10] Statutes of Canada, 57 & 58 Vict., c. 30.

[11] "Report of Annual Meeting", IX (1895), pp. 44-45. The CSCE particularly objected to laws which designated surveyors as "engineers" for distinctly civil engineering work. See eg.: EIC Letter Books, Letter from McLeod, 14 March 1898, p. 30. Dominion Land Surveyors, however, had their own complaints about engineers encroaching on their domain. See: Don W. Thomson, Men and Meridians: The History of Surveying and Mapping in Canada, Vol. 2, (Ottawa, 1967) pp. 64-65.

[12] See eg.: James T. Child's remarks, "The Professional Status — Correspondence", Trans CSCE, VII, (1893) p. 254. Keefer dated this agitation from the formation of the land surveyors into a close corporation. It is not clear, however, the exact date to which

he was referring, since surveyors — at least in Ontario — did not become a close corporation until 1892. (Ontario Statutes, 55 Vict. c. 45). Perhaps he was referring to the organization of the Association of Provincial Land Surveyors of Ontario (1886), or the granting of exclusive survey privileges to Dominion Land Surveyors on Dominion Lands under the Dominion Lands Act, 1874. See: "President's Address", (1888) p. 10.

[13] "Discussion on the Professional Status", ibid., VI (1892) pp. 114, 249-250; Letter Books, C.H. McLeod to C.E.W. Dodwell, 10 June 1892, p. 840. Ibid., McLeod to D. Macpherson, 24 July 1901, p. 148.

[14] "Association of Ontario Land Surveyors", Canadian Engineer III (April, 1895) p. 342; "Proceedings of the Toronto Summer Meeting", Trans CSCE, X (1896) p. 98.

[15] Canadian Engineer IV (May, 1896) p. 16.

[16] "Discussion on the Professional Status", pp. 116-117; Canadian Engineer, II (Nov. 1894) p. 217; "Report of the Annual Meeting", Trans CSCE IX (1895) pp. 16, 83; Edit. "Free Engineering Advice", Canadian Engineer 17 (4 Oct. 1909) pp. 367-368. Willis Chipman, respected Toronto consulting engineer, believed that the profession was being corrupted and degraded by what he described as "American methods" of lobbying small municipalities for work; unseemly competitive practices introduced into Canada by American engineers who viewed engineering as a business, not a profession. Willis Chipman to Editor, ibid., VIII (1 Apr. 1901) pp. 254-255.

[17] Ibid., Robert W. King to Editor, ibid., XIV, (Dec. 1900) p. 162; "Report of Annual Meeting", Trans CSCE XV (1901) pp. 38-40; ibid., XVI (1902) p. 21.

[18] See eg.: "Discussion on the the Wielder of the Weapon", Trans CSCE XXVIII (1914) p. 509; Hyman Goldman to Editor, Canadian Engineer, 34 (9 May 1918) p. 409; "Classification and Remuneration of Engineers", ibid., 43 (26 Dec. 1922) p. 662.

[19] "President's Address" (W.T. Jennings), Trans CSCE XIV (1900) p. 30.

[20] "President's Address" (John Kennedy), ibid., VII (1893) p. 15. Not all engineers shared this lofty ideal. For some, economic conditions, as much as character, determined ethical conduct. In 1918, for example, H.A. Goldman asserted that increased competition, arising from occasional oversupply of engineers, accounted for the fact that some engineers were willing to take a colleague's job for less money. Hyman Goldman to Editor, Canadian Engineer, p. 409.

[21] Alan Macdougall, "The Professional Status: A Plea for a Close Corporation", Trans CSCE VI (1892) p. 111.

[22] See: ibid., pp. 98-113.

[23] Minutes, Ordinary Meeting, 20 May, 1892, p. 125; "Report of Annual Meeting", Trans CSCE VII (1893), pp. 17, 19-20; Council Minutes, 11 Oct. 1892, p. 122.

[24] Ibid., 6 Dec. 1892, p. 134; "Report of Annual Meeting", Trans CSCE VII (1893) pp. 18-19.

[25] Ibid. VIII (1894) p. 47; ibid. IX (1895) pp. 42-46, 49; ibid. X (1906) p. 10; Council Minutes, 8 Oct. 1895, pp. 236-237.

[26] The Ontario Association of Stationary Engineers, Incorporated 1891, was only empowered to hold examinations and grant certificates of qualification and efficiency to stationary engineers. An employer was not obliged to hire Association members. The Institute of Chartered Accountants of Ontario, functioned as an educational and certification body. It established classes, lectures and examinations, tested candidates for admission and granted diplomas of fellowship, enabling members to use the letters F.C.A. Minutes, Annual General Meeting, 14 Jan. 1896 (enclosure), "Memorandum for the Committee of the Canadian Society of Civil Engineers Appointed to Consider and Secure Special Legislation" (strictly confidential). Hereafter cited: "Memorandum for ... Special Legislation".

[27] By 1892, only lawyers, doctors, dentists and provincial land surveyors in Ontario had the exclusive statutory powers to control and regulate their respective

professions. Pharmacists enjoyed similar power under the Pharmacy Act. Ibid. The architectural profession, however, was not a close corporation. The Architects Act, 1890, incorporated the Ontario Association of Architects (OAA) and gave it the power to certify, not license members. Only the title "Registered Architect" was protected; no penalties were prescribed for non-members who practised architecture. A 1931 Act established a Registration Board with licensing and regulatory powers, while the OAA was directed to perform the educational and administrative functions of a professional society. In 1935, the profession finally gained full self-governing and regulatory powers when the Registration Board and the OAA were integrated. See: Raymond Card, Ontario Association of Architects, 1890-1950, (Toronto, 1950) pp. 7-32 passim. As well, it was not until 1958 that Veterinary Surgeons finally acquired full regulatory powers to control their profession. See: A. Margaret Evans and C.A.V. Barker, Century One: A History of the Ontario Veterinary Association, 1874-1974, (Guelph, 1976) pp. 181, 254-268. Appendix D.

[28] "Report of Annual Meeting", Trans CSCE VII (1893) p. 18. For a cogent analysis of the power of professional self-government, see: Government of Ontario, Royal Commission, Inquiry into Civil Rights, Report, No. 1, Vol. 3 (Toronto, 1968) [hereafter cited: McRuer Report], chap. 79.

[29] "Report of Annual Meeting" (1893) p. 18.

[30] EIC Scrap Book No. 1, "Memorandum for the Use of the Provincial Committee on Incorporation", 3 July, 1897. Senior CSCE member, E.A. Keating, later asserted that the CSCE "embraces with very few exceptions all of the civil engineers in the Dominion of Canada from Atlantic to the Pacific ...", E.A. Keating to Editor, Toronto Globe, 6 March 1902, p. 7.

[31] Letter Books, C.H. McLeod to Willis Chipman, 23 March, 1899, p. 548.

[32] This criteria was the same as the CSCE admission standards. See Chapter II, p. 51.

[33] Letter Books, Letter from Alan Macdougall, 31 August, 1893, p. 189; Macdougall, "The Professional Status: A Plea for a Close Corporation", p. 244.

[34] "Memorandum for ... Special Legislation".

[35] Ibid.

[36] Minutes, Annual General Meeting, 14 Jan. 1896 (enclosure), "Dominion Bill" (strictly confidential).

[37] Ibid., "An Act Respecting the Profession of Civil Engineers" (strictly confidential).

[38] "Report of Annual Meeting", Trans CSCE X (1896) pp. 9-11.

[39] Canadian Engineer IV (July, 1896) p. 80; Council Minutes, 11 Feb. 1896, pp. 250-251; "Report of Annual Meeting", Trans CSCE X (1896) pp. 13-14.

[40] Ibid., p. 2.

[41] "Civil Engineering a Close Profession in Manitoba", Engineering News XXXVI, No. 8 (1896) p. 123.

[42] "Report of Council", Trans CSCE XI (1897) p. 13; "Report of Annual Meeting", ibid. XII (1898) p. 4; Letter Books, McLeod to D. Macpherson, 24 July, 1901, p. 149.

[43] Council Minutes, 8 Dec. 1896, pp. 297-298; Letter Books, McLeod to Archibald, 27 Jan. 1897, p. 536.

[44] EIC Scrap Book, No. 1, Newspaper Clipping, n.d. (13 Jan. 1897, ?).

[45] "Report of Annual Meeting", Trans CSCE XII (1898) pp. 14-15.

[46] Letter Books, McLeod to M. Drummond, 9 June 1897, p. 730; ibid., McLeod to Willis Chipman, p. 525.

[47] Ibid., McLeod to M. Murphy, 18 Jan. 1898, p. 932.

[48] At the request of the surveyors, the CSCE exempted government colonization roads, ordinary roads in rural municipalities and bridges, not exceeding $600.00, from the definition of 'civil engineering' activities in the bill. (Statutes of Quebec, 61 Vict., c. 32, s.1 [d]) Engineers did not usually work on colonization roads and the CSCE recognized that surveyors were incapable of building an expensive bridge. ("Report of Annual Meeting", Trans CSCE, XI [1897] p. 25). At the same time, however, suspicious that surveyors were attempting to delay and, ultimately, defeat the bill, McLeod requested CSCE members, who were also Provincial Land Surveyors in Quebec, to attend a surveyors' meeting, in order to explain the CSCE's position. (Letter Books, McLeod to St. George Boswell, 24 Nov. 1897, p. 836; ibid., McLeod to St. George Boswell, 3 Dec. 1897, p. 853; McLeod to A. Duclose, 3 Dec. 1897, p. 855; McLeod to G.A. Mountain, 13 Dec. 1897, p. 862; ibid., McLeod to G.K. Addice, 13 Dec. 1897 [private and personal], p. 864). Engineering licensing laws, the CSCE maintained, would not interfere with the rights of Provincial Land Surveyors, because there was a clear distinction between land and engineering surveyors. The principal function of a land surveyor, according to a CSCE memorandum, was to determine "the boundaries and dimensions and areas of properties", whereas engineers surveyed the "location of various works of construction ..." EIC Scrap Book, No. 1, "Memorandum for the use of the Provincial Committee on Incorporation", 3 July, 1897.

[49] Herbert Wallis, chairman, Committee on Incorporation, thought that there were about 132 members on the rolls of the Corporation of Provincial Land Surveyors of Quebec, 45 of whom were CSCE members. "Report of Annual Meeting", Trans CSCE XII (1898) p. 13.

[50] "Civil Engineer's Bill", Journal of the Canadian Mining Institute [hereafter cited: Jour CMI] II (1896) p. 256.

[51] Edit., "Amazing Arrogance", Canadian Mining Review, XVI (Feb. 1897) p. 37.

[52] EIC Scrap Book, No. 1, Evening Mail, 18 Feb. 1897, John Hardman to Editor (newspaper clipping).

"Canadian Society of Civil Engineers' Bill", *Canadian Mining Review*, XVI (March 1897) p. 187.

[53] Edit. "Amazing Arrogance", *Canadian Mining Review*, p. 37.

[54] The history of this Society is somewhat obscure. E.A. Keating confessed that he had never heard of it and, after enquiries with other engineers, even doubted its existence, (E.A. Keating to Editor, Toronto *Globe*, 6 Mar. 1902, p. 7). The DIAE's secretary, however, estimated that the Society had approximately 2,000 members (twice the CSCE's membership), 500 to 600 of whom, he claimed, were 'civil' engineers. Although some prominent engineers, such as Sandford Fleming, were members, the DIAE admitted non-professionals. For this reason, the CSCE dismissed this organization as non-professional and refused its offer of affiliation. See: "The Royal Commission on the Alleged Employment of Aliens in Connection with the Surveys of the Proposed Grand Trunk Railway: Report of the Commission and Other Documents", in Canada, House of Commons, *Sessional Papers*, (1905) No. 36a, "Minutes of Evidence", pp. 149-151, 441-442; Council Minutes, 2 May 1902, pp. 266-267.

[55] Public Archives of Ontario, Pamphlet, No. 37, Dominion Institute of Amalgamated Engineering, *Open Letter Regarding the Introduction into the Provincial Legislature of a Bill of the Canadian Society of Civil Engineers which has its Headquarters in the City of Montreal as Ordered by that Society's Council for Making All Branches of Engineering a Close Corporation*, [hereafter cited: DIAE, *Open Letter Regarding CSCE's Bill*], n.p.

[56] *Ibid.*

[57] "The Canadian Mining Institute", *Canadian Engineer*, 8 (April, 1901) p. 258.

[58] EIC Scrap Book, No. 4, "Engineering Trust in Formative Stage", *Halifax Herald* (newspaper clipping, n.d.). An official of the Attorney General's office was reported to have described the 1902 bill as the "most vicious piece of class legislation" he had ever seen. (University of Toronto Library, John Galbraith Papers, B 36 [B-70-001] Box #1 [hereafter cited: Galbraith Papers], W.L. Goodwin to Galbraith, 28 Feb. 1907).

These critics, as well as the DIAE and the CMI, recognized correctly that the legislation sought by the CSCE would give civil engineers virtually the right to determine who could earn a living practising engineering. (On the potential for the abuse of legislated power by self-governing professional societies, see: *McRuer Report*, Vol. 3, pp. 1163-1166). Other professionals had attempted to use legislation to restrict competition. In 1893, for example, a front group for the Ontario College of Pharmacy attempted unsuccessfully to have the sale of patent medicines made a legal monopoly of pharmacists by having their ingredients classed as poisons. Michael Bliss, "The Protective Impulse: An Approach to the Social History of Oliver Mowat's Ontario", in Donald Swainson (ed.), *Oliver Mowat's Ontario*, (Toronto, 1972) p. 185, n. 20.

[59] "The Canadian Mining Institute", *Canadian Engineer*, p. 259.

[60] "Engineering Trust in Formative Stages" (clipping), n.p.

[61] EIC Scrap Book, No. 1, "Kill This Bill", Kingston, *Daily British Whig* (newspaper clipping), n.d.

[62] *Ibid.*, Council Minutes, 11 March, 1902, p. 218.

[63] *Ibid.*, 12 April, 1898, p. 51; Letter Books, McLeod to Willis Chipman, n.d., p. 272; 8 March, 1899, p. 515; 9 Jan. 1900, p. 991; *ibid.*, McLeod to J.P. Mallarkoy, 21 Jan. 1899, p. 389; "Report of Annual Meeting", *Trans CSCE*, XVI (1902) p. 24.

[64] Letter Books, McLeod to Carr-Harris, 25 March 1899, p. 559; McLeod to B.T.A. Bell, 3 Jan. 1900, p. 980; McLeod to Willis Chipman, 3 Jan. 1900, p. 982; Canadian Institute of Mining and Metallurgy, Montreal Council Minutes [hereafter cited: Council Minutes, CMI], 17 Jan. 1900, p. 40; Letter Books, McLeod to Willis Chipman, 19 Jan. 1900, p. 32; Council Minutes, 13 Feb. 1900, pp. 137-138; Letter Books, McLeod to B.T.A. Bell, 18 Feb. 1900, p. 117; *ibid.*, McLeod to J. Galbraith, 6 March, 1900, p. 166; Council Minutes, CMI, 10 March, 1900, p. 45; Council Minutes (CSCE), 13 March, 1900, p. 141; Letter Books, McLeod to Galbraith, 14 March, 1900, p. 188; *ibid.*, McLeod to B.T.A. Bell, 23 March, 1900, p. 208.

[65] "C.S.C.E. Annual Meeting", Canadian Engineer, VII, (March, 1900) p. 295; "Report of Annual Meeting", Trans CSCE, XIV (1900) p. 9.

[66] Letter Books, McLeod to Willis Chipman, 23 March, 1899, pp. 547-548; ibid., McLeod to G.M. Macdonell, 3 March, 1902, p. 584; McLeod to W.R. Butler, 14 March, 1902, p. 640; McLeod to C.B. Smith, 14 March, 1902, p. 645.

[67] Ibid., McLeod to L.W. Gill, 3 April, 1902, p. 692.

[68] Although mining engineers were exempted from the bill (see: "An Act Respecting Civil Engineers", s.8, printed in "Report of Annual Meeting", Trans CSCE XVI [1902] p. 24), they could, as Dr. W.L. Goodwin, Director School of Mines, Kingston, pointed out, be excluded from civil engineering related mine work, because only 'civil' engineers (not defined in the bill) could practise (section 2). "Canadian Society of Civil Engineers Bill", Jour CMI V (1899) pp. 560-561.

[69] Ibid.

[70] See eg.: DIAE, Open Letter Regarding CSCE's Bill.

[71] Council Minutes, CMI, 7 April, 1905, p. 167 (insert).

[72] See especially: EIC Scrap Book, No. 1, John E. Hardman to Editor, Evening Mail, 18 Feb. 1897 (newspaper clipping).

[73] John Galbraith Papers, Box #1, W.L. Goodwin to Galbraith, 28 Feb. 1907. For the reaction of surveyors, see: "Ontario Land Surveyors", Canadian Engineer, 18 (March, 1902) p. 105.

[74] Edit. "An Objectionable Bill", Toronto Globe, 4 March, 1902, p. 6; edit. "The Engineers' Bill", ibid., 6 March, 1902, p. 6. Both Goodwin and the Globe clearly

understood that the CSCE was essentially asking the government to delegate part of its legislative and judicial functions. In their view, this was not only an abrogation of government responsibility, but a manifest injustice; it would confer extraordinary powers on a private society which did not represent the whole profession. Moreover, the validation of the CSCE's by-laws, they argued, would give it undisclosed powers which would be used arbitrarily against the interests of non-civil engineers. It could determine, for example, who was qualified to practise, since, as Goodwin observed, the CSCE by-laws would give the Society power to define what was a 'civil' engineer. Ibid., "Canadian Society of Civil Engineers Bill", Jour CMI, pp. 560-561.

[75] Minutes, Special General Meeting, 17 June, 1896, p. 38.

[76] Ibid., Minutes Ordinary Meeting, 17 June, 1896, p. 39. Professor McLeod maintained that, while there were very few cases of blackballing, "one or two had occurred". He confirmed that only ten negative votes could exclude a candidate from membership, since about one hundred election ballots were returned usually. He argued, however, that when the CSCE was a close corporation, there would be little likelihood of a cabal forming against a candidate when his livelihood was at stake. The Quebec Provincial Committee on Incorporation, he noted, was not so much concerned with the possibility of an unjust exclusion, as with possible objections to the potential injustice of admission by election. "Proceedings of the Toronto Summer Meeting", p. 102.

[77] Michael J. Trebilcock, Carolyn J. Tuohy, Alan D. Wolfson, Professional Regulation: A Staff Study of Accountancy, Architecture, Engineering and Law in Ontario Prepared for the Professional Organizations Committee, (Toronto, 1979) p. 26.

[78] "Report of Annual Meeting", Trans CSCE X (1896), p. 8; Letter Books, McLeod to C.E.W. Dodwell, 22 Nov. 1898, p. 271; ibid., McLeod to N.E. Brooks, 14 March, 1902, p. 344; "The Status of Civil Engineering", Canadian Engineer, IX (April, 1902) p. 87.

[79] "Proceedings of the Toronto Summer Meeting", p. 100.

[80] "Memorandum for ... Special Legislation".

[81] Engineering News, XXXVI (August, 1896) p. 120; Council Minutes, 5 Jan. 1897, p. 304; "Report of Annual Meeting", Trans CSCE, XII (1898) pp. 13-14; Rutan also pointed out that it was now possible for engineers to sue and recover fees for service. Ibid., p. 14.

[82] "Report of Annual Meeting", Ibid., XXII (1908) p. 38.

[83] Letter Books, McLeod to Hon. Secretary, Centro Nacional de Ingenieros, Buenos Aires, 17 June, 1902; ibid., McLeod to S. Whinery, 6 March, 1902, p. 602.

[84] Both Chipman and McLeod complained of apathy among Ontario members. "The real reason why our bill [1899] did not go through the Ontario Legislature", McLeod asserted, "was that the members of the Society resident in Ontario have not taken sufficient interest in this measure ..." Ibid., 11 April, 1899, p. 590.

[85] See J.G.G. Kerry's views: J.G.G. Kerry, "The Past", Engineering Journal, XXX (August, 1947) p. 370.

[86] Council Minutes, 13 Jan. 1903, pp. 246-247; 21 April, 1903, p. 262; 2 May, 1903, pp. 265-268; 12 May, 1903, p. 270. In the same year, the CSCE stopped the incorporation of the "Manitoba Institute of Engineers and Architects" ("Report of Annual Meeting", Trans CSCE XVII [1903] p. 4). In 1911, however, the CSCE failed to persuade the Ontario Government not to incorporate the Society of Domestic Heating and Sanitary Engineers. (University of Toronto Library, CSCE Toronto Branch Papers, MS 102, Box #2, A.C. Blanchard to C.H. McLeod, 11 May, 1911; ibid., A.C. Blanchard to A.B. Barry, 16 June, 1911, A.C. Blanchard to C.H. McLeod, 16 June, 1911; Secretary, Toronto Branch, to E.H. Keating, 23 Oct. 1911; Secretary, Toronto Branch, to C.H. McLeod, 25 Oct. 1911; Council Minutes, 13 May, 1911, p. 48; ibid., p. 67). Engineers were deeply offended by the usurption of the title "Sanitary Engineer" by plumbers and steamfitters. They believed that this title legitimately described a well established branch of civil engineering and feared that

the prestige of tradesmen would be enhanced ("Bill Dobbs the plumber will become Mr. William Dobbs the Sanitary Engineer", edit. "Canadian Society of Sanitary Engineers", Canadian Engineer 21 [26 Oct. 1911] p. 486), at the expense of engineers. "It is a serious blow at the prestige and dignity of the engineering profession in Canada ..." lamented the Canadian Engineer. Ibid., (2 Nov. 1911) p. 514.

[87] Council Minutes, 8 Oct. 1910, pp. 358f; "Report of Annual Meeting", Trans CSCE XXV (1911) p. 121; Council Minutes, 8 Feb. 1913, p. 173.

[88] Ibid., 8 Oct. 1916, p. 358f.

Chapter VI

IN SEARCH OF A "TRIBAL SOUL"

THE BIRTH OF THE ENGINEERING INSTITUTE OF CANADA

Criticism of the CSCE grew in intensity and volume. By the First World War, not only was it attacked for not protecting its members, but its integrity as a learned society was also questioned. This criticism peaked in 1916 and resulted in major changes which marked the most important turning point in the CSCE's history.

I

There was a widespread feeling among engineers that the CSCE had not benefitted individual members, nor significantly raised their status. The Society was neither recognized by the public nor even accepted by all qualified engineers.[1] To a certain extent, this was a consequence of the CSCE's failure to fulfil its primary function, the interchange of professional knowledge.

The reading and discussion of professional papers were the principal means by which the CSCE functioned as a learned society. However, if a learned society is judged by the quality of its publications, the CSCE lacked professional stature. Although the CSCE was originally incorporated as a general engineering society and, while many of its early papers examined subjects from all fields of engineering, most papers concerned civil engineering, particularly construction and hydraulic engineering. They were descriptive rather than theoretical, too general or too narrowly defined to compare favourably with papers published by the ICE or ASCE.[2] They had little practical value for practising engineers and were, according to one cynic, "essentially for the benefit or amusement of those men in Montreal who have the honour of running the Society ..."[3]

CSCE Presidents rarely missed an opportunity to point out that reading papers was not only good for the Society, but also an excellent way to bring members, especially younger members, into professional prominence.[4] Even so, the CSCE always experienced difficulty in obtaining good papers.[5] While members were obliged to give presentations as a condition of membership, the number of papers presented, compared with the CSCE's increasing membership, steadily declined.[6] Moreover, because of lengthy publication delays, many interesting and valuable articles were published in the technical press, instead of the Society's *Transactions*.[7] There was also some doubt about whether the CSCE was advancing engineering research. Dissatisfaction periodically erupted over the quality of CSCE engineering standards and specifications, prepared by various standing committees.[8]

Dissatisfaction soon resulted in widespread apathy. Meetings were poorly attended — even some Councillors were delinquent[9] — and discussions, following the presentation of papers, in John Galbraith's words, were "meagre and incomplete".[10] The CSCE fell into a lethargy from which it was only temporarily aroused at the Annual Meeting, the Society's premier event prior to the inauguration of the Professional Meetings in 1918. This somnolence reminded one engineer of a bear named Barney, chained to a pole in White River. During the summer, he explained, Barney would walk around the pole all day and then retire to his den for the winter. "Now, I think the Canadian Society of Civil Engineers is very much like that bear", the engineer mused, "we come out of our dens once a year, hold our Annual Meeting, walk around and around the same propositions ... and then — go back to our dens and sleep for the balance of the year".[11]

Judged by its own standards as a learned society, the CSCE was inadequate. "The general feeling among the majority of engineers", claimed A.N. Worthington in 1917, "is that the Canadian Society of Civil Engineers has neither significance nor status and as such there is no advantage in belonging to it ..."[12] Three groups of engineers were particularly ill-served: non-civil engineers, western and maritime engineers and young engineers. Although, by 1921, less than half the engineers in Canada were 'civil' engineers (43.0 percent),[13] the CSCE was predominantly a civil engineering society.[14] Mining engineers had their own society and mechanical and electrical engineers joined branches of foreign societies. With Society affairs concentrated in Montreal, non-resident members enjoyed few benefits. Discontent was strongest in regions furthest from Montreal. Vancouver engineer, G.R.G. Conway, for example, declared that British Columbia members felt that Headquarters was "somewhat out of touch, both geographically and in spirit, with western ambitions ..." and noted that western members did not want to form, as he put it, "a purely local society for members in the neighborhood of Montreal and Ottawa, living under the influence and fostering care of McGill University".[15] Maritime engineers were also indifferent to the CSCE. In 1921, for example, less than half of the civil engineers in New Brunswick and Nova Scotia were CSCE members.[16] Antipathy toward the CSCE, among some Nova Scotia members, developed to such an extent that a separate engineering society, the Nova Scotia Society of Engineers, was organized in 1907.[17] With the possible exception of McGill engineering graduates, young engineers did not join the CSCE until they were well established.[18] CSCE membership conferred few professional advantages and older members neither encouraged nor aided the professional development of younger members.[19] "Nobody is ever asked for references from the Canadian Society", declared a New Brunswick engineer, "nor is the question raised as to his standing in the Society; indeed, his membership in the body is never considered except in such places as Montreal or Toronto, where the Society is well known ..."[20] In view of the intention to make CSCE membership, like ICE membership in Great Britain, the mark of professional distinction, his statement is a strong indictment.

I.

Criticism focused on the Montreal Clique. It first erupted in 1908 and, later in 1913. These attacks eventually forced concessions, during the Great War, which substantially altered the CSCE's constitutional structure and undermined the Montreal Clique's power. Yet, in spite of these changes, it is remarkable that the Montreal Clique maintained its power and forestalled change for so long. In large measure, this was a consequence of clever management and pragmatic reforms.

Although the Montreal Clique's power ultimately stemmed from inequities in the CSCE's electoral system,[21] it had other advantages. There was no organized and articulate opposition.[22] In the face of widespread apathy, the Montreal Clique's benevolent rule was tolerated because it was the only faction capable of assuming the burden of governing the organization. Few critics possessed the time or the means to attend the Annual Meetings and the Montreal Clique was adroit enough to defer opportunities for criticism to the dying hours of the Annual Meeting.[23] As well, younger members were intimidated by the professional stature and corporate rank of the Montreal Clique, many of whom were either employers or potential employers.[24]

In its analysis, tactics and rhetoric, the Montreal Clique revealed its corporate background. When criticized, it adopted an uncompromising paternalistic attitude and treated critics as if they were ill-behaved employees. It diminished criticism by denying the existence of serious trouble and discredited critics by calling them vindictive malcontents.[25] More significantly it turned criticism back on the critics by blaming the membership for the Society's shortcomings. With some justification, it argued that some members held unrealistic expectations, that others were ignorant of the Society's limited purpose and that most were apathetic.[26] Taking a narrow view of its constitutional reponsibilities, the Montreal Clique asserted that its role was strictly administrative; initiative for a change must originate from individual members.[27] As Ernest Marceau, the CSCE's first French Canadian President, explained:

> ... the Society's usefulness to its members depends upon the usefulness of each individual member to the Society, and that free and liberal interchange of ideas should be encouraged and practised by every member. In this way the Society will be improved, and by keeping this in mind and acting together the standard of the Society will be raised and it will be more able to impress its influence on the larger questions of the times, and compel the respect which such a national body of engineers should command.[28]

At the same time, other more constructive measures were taken which helped pacify discontent. The Annual Meetings were held periodically in major centres outside Montreal in order to encourage greater participation. Prizes for outstanding papers, such as the Gzowski Medal, were awarded for professional excellence. In addition, in an effort to broaden the professional scope of the Society and increase its attractiveness to non-civil engineers, the CSCE, in 1903, formed four sections: electrical, mechanical, mining and general (i.e. civil). This innovation was significant, because it helped prevent the fragmentation of the CSCE into separate specialized societies, as had already occurred in Great Britain and the United States.[29]

The establishment of branch societies was perhaps the most important pre-war initiative. As CSCE activities were centred in Montreal, non-resident members, unable to attend the Annual Meetings, had virtually no contact with the Society, except through its publications and notices.[30] Although the founding members had foreseen the need for branches and made provision for them in the Constitution,[31] none existed prior to 1906. As hostility to Montreal mounted, branches were encouraged in order to counter centralist tendencies and to accommodate regional interests. Also, branches may have been promoted as a means to forestall the growth of separate engineering societies, such as the Regina Engineering Society, or the Nova Scotia Society of Engineers.[32]

Branches were a microcosm of the parent society. An elected executive managed its affairs[33] and, with a few minor variations, by-laws were the same. Provision for sections was made and a system of fee rebates from Montreal financed the branches. All CSCE members were automatically branch members if they resided within a specified radius of a branch. Normally, any ten corporate members could petition to form a branch, but occasionally they were organized from a few existing, independent, engineering societies.[34] Although enthusiasts claimed that branches were "practically independent"[35] they were, nevertheless, effectively controlled by the CSCE and made to conform to specific objectives.[36] They were constituted strictly as learned societies[37] and membership did not release engineers from their obligations to the parent society. By 1922, with twenty-two branches, the CSCE had the most unique and extensive system of branches of any engineering society in the world.[38]

Generally, branches prospered when they served members' interests. As learned societies, however, they were less successful. They had difficulty attracting members, especially younger members, and, like the national Society, could not generate enough interest in the reading and discussion of papers.[39] The fate of the Toronto Branch, the largest prior to 1911,[40] was typical. Organized in 1890 (largely through the efforts of Alan Macdougall), the Toronto Branch was the CSCE's first. It lasted barely three years. Toronto members were disinterested and unwilling to support it financially.[41] Similar difficulties occurred after 1906, when the Branch was revived and reorganized.[42] Less than ten percent of its members attended meetings and, in 1913, no papers were presented.[43] By contrast, the Toronto Engineers' Club, founded 1899, prospered because, unlike the Toronto Branch, it catered to the engineers' business and social requirements.[44] It was not until the Toronto Branch combined with other Ontario branches to lobby for restrictive provincial licensing powers, that it flourished, but only briefly. The newly formed licensing body soon eclipsed the Branch, which had reverted to a learned society. A similar fate awaited the CSCE.

III

Clever management and pragmatic reforms, however, did not assauge indignation over the CSCE's deficiencies. Moreover, although the Society had united engineers, it had failed to develop professional consciousness and to gain public recognition. Engineers were still recognized as individuals, not as a profession.[45] For nearly half a century, engineers had cultivated the trappings of professionalism — schools, societies and journals — in order to rise above the status of tradesmen. But, by 1914, although engineers believed that they had substantially fostered Canada's material progress, the engineering profession remained unrecognized.[46] To the public, an 'engineer' meant anything from a locomotive driver to a plumber.[47] The engineer's title was not protected by law (except in Manitoba and Quebec after 1898) and anyone could — and frequently did — style himself an 'engineer', regardless of qualifications or experience.[48]

Engineers complained that other professionals, particularly lawyers and doctors, commanded undeserved measures of public esteem.[49] They even resented the attention lavished on geologists and envied the higher status enjoyed by engineers in other countries.[50] Although private corporations had begun to recognize engineers by promoting them to managerial positions, governments continued to appoint lawyers to railway commissions and inquiries (largely through party patronage), and excluded engineers from Boards of Health.[51] Moreover, while engineers played a crucial role at home and abroad during the First World War, they protested that they were not always effectively employed and that they were sometimes passed over in favour of other professionals, usually lawyers, for the command of engineering units.[52] Ignored by the press (except when it sensationalized the slightest controversy arising out of a public works department investigation),[53] engineers also felt they were only indirectly recorded by history.[54] While the public displayed genuine interest in great engineering projects, the engineer was often overshadowed by the grandeur of his own work and soon forgotten after its completion.[55] The ordinary citizen, engineers believed, saw no romance in such commonplace necessities as sewers and soon took them and the engineer for granted.[56] An engineer, it was argued, could devote his life to furthering the progress and welfare of the community and never come to public attention, unless he made a mistake.[57] "The Quebec Bridge", commented W.J. Francis, "was more widely known by its failure than it or any other bridge will be in its success ..."[58]

Engineers deeply resented their low social status. In their view, their standing was not commensurate with their contribution to society. The First World War acted as a catalyst to this discontent and engineers became fiercely determined to raise their status. At first, they blamed themselves for their misfortune, but, later, reflected that their preoccupation with acquiring professional knowledge, to the neglect of social problems, may have been responsible for their low status.

In January, 1916, in an attempt to increase the Society's prestige and influence, a twenty-four man Committee on Society Affairs was appointed under the chairmanship of H.E.T. Haultain, Professor of Mining Engineering, University of Toronto, by the general membership, on an equitable and representative basis.[59] This was the most important committee in the CSCE's history. Free of the Montreal Clique's influence, it changed the Society's thinking and its recommendations had far reaching consequences.[60]

Although a strong supporter of the CSCE, the irascible and outspoken Professor Haultain was not a member of the Montreal Clique. Like many engineering professors, he was more liberal than most engineers, but he was not a radical. He believed that the CSCE was fundamentally sound[61] and observed that engineers, in sharp contrast to doctors and lawyers, did not have a strong sense of professional identity or, as he put it, a "tribal soul".[62] In this regard, Haultain had astutely identified the major factor inhibiting further professional development and public recognition.

Engineers were not a clearly defined and cohesive group. They were scattered over an immense, sparsely populated frontier and moved nomadically from job to job, absorbed in hectic, demanding and sometimes dangerous work. As such, they were isolated — almost strangers to each other[63] — and professed to have little time, or even interest in professional activities. They were difficult to organize and indifferent to organization. By nature, they were staunch individualists, self-reliant and independently minded. They were ambitious, fiercely competitive and largely insensitive to the professional welfare and livelihood of brother engineers. Already fragmented by engineering specialization and torn by the conflicting demands of business and science, engineers were also divided by a professional class structure, founded on corporate hierarchy. These factors combined to blunt their enthusiasm for professional unity and to arrest the development of a professional identity.

Traditionally, engineers sought public recognition as individuals by building personal engineering reputations. Unlike law and medicine, however, there was little social distinction in being an engineer. Haultain recognized that the CSCE could not raise the engineer's status solely by improving his professional knowledge. Only the community could confer higher social status. He argued that engineers had isolated themselves from the community by their preoccupation with the technical aspects of engineering:

> ... we have segregated ourselves and the great mistake of the engineers is, we are paying so much attention to our work, we aren't thinking of anything else. We think in terms of copper and concrete, etc., instead of thinking in terms of the community. The community is of more importance to us than our profession and our work ...[64]

To win public recognition, engineers must be more than technically competent, they must see engineering in a social context and develop a broad social consciousness; engineering must become truly altruistic. To this end, Haultain advised engineers to develop "the tribal instinct"[65] and seek recognition as a group through public service. Unless they changed their attitude and broadened their outlook, they would forever be regarded as tradesmen, not professionals. "[I]f we are going to bow down to wood and stone, concrete and copper ..." Haultain warned, "that is all we will amount to ... we will remain hewers of wood and drawers of water ..."[66]

Haultain successfully persuaded his colleagues that the public would only recognize the profession when the profession served the public; that claims for recognition must be based on service rendered to the community. A committee of the Toronto Branch later explained that

> ... the status of engineering can be improved mainly by increasing its usefulness to humanity. It must

> be the aim of the engineer, therefore, to serve and guide the people and cultivate healthy, vigorous, and pronounced public opinion. It is coming to be realized more and more that engineers owe it to themselves and to the country alike to accept their duties as citizens of the community in which they live, and that they should use every effort to exert influence in the legislation of the country and the administration of public affairs whenever engineering principles or practices are involved.[67]

Thus public service, not technical excellence, was the crucial factor in the engineer's pursuit of greater social recognition. "If we do not as a body serve the public," commented R.O. Wynne-Roberts, "we cannot legitimately expect its high esteem ..."[68]

This dramatic shift in opinion, within the CSCE, may have been partly inspired by a 'revolt' of 'progressive' American engineers to unite their profession and to use it as an instrument of social reform.[69] Although Canadian engineers were aware of this development, they were more inspired by opportunism than by altruism. They realized that they had received more public recognition for their war service than for fifty years of internal professional development and assumed that economic benefits would accompany public recognition. Technical excellence was of course essential, but public service was more rewarding. Engineers easily accepted this notion, since it was ideologically consistent with, and complimentary to, their technocratic views. It seemed reasonable to them that the "most valuable citizens in the community",[70] the men who built the modern world, should also solve modern social problems.

For the most part, the new principle of public service was derived from the older consultative professions and applied to a small minority of independent consulting engineers. Nevertheless, it was another major shift away from the CSCE's concern with educational matters. To this extent, it ran directly counter to the Montreal Clique's conception of the CSCE as a learned society and represented a fundamental, almost revolutionary, change in the Society's outlook.[71]

IV.

On 30 October, 1917, the Committee on Society Affairs submitted its recommendations to Council.[72] They were approved and a letter ballot was issued to the membership. The most important recommendations were: complete revision of the By-Laws; appointment of a full-time Secretary; establishment of a monthly journal and a change in the Society's name.

The new By-Laws introduced sweeping changes that not only redefined the Society's objectives, but fundamentally altered the power relationships within the CSCE. The original object was educational: "To facilitate the acquirement and interchange of professional knowledge among its members and to encourage original investigation". This was retained, but important new objects were added. The Society would "promote [members'] professional interests ... develop and maintain high standards in the engineering profession", and, most significantly, "enhance the usefulness of the profession to the public".[73] This would be implemented by the branches.

The Committee on Society Affairs believed that the branches were the most important factor in the CSCE's development.[74] They represented the Society locally, were its "sentinels",[75] or the vital link between the profession and the public, as well as the means to serve the public. Originally, branch activities were limited but, by 1922, they were the most important centres of professional development.[76] While the Council set broad policy guidelines, the branches were, according to Fraser S. Keith, "the active energizing agents".[77] The new By-Laws increased branch autonomy. This accelerated the CSCE's decentralization — a trend initiated in 1908.[78] This was ironic, since the branches were originally encouraged, in part, to accommodate regionalist sentiment.

The undemocratic nature of the CSCE's electoral system continually prompted demands for reform. Prior to 1918, the By-Laws, governing the election of the Nominating Committee and Councillors, encouraged disproportionate representation from Montreal area engineers.[79]

7

After 1918, under the new By-Laws, electoral power was more equitably distributed. Montreal was guaranteed only two Nominating Committee members and two Councillors. The other Nominating Committee members were elected mainly by the branches[80] and the remaining Councillors were nominated from eight "electoral districts", spread evenly across Canada. Although Montreal continued to have considerable influence, after 1918 the new By-Laws effectively broke the back of the Montreal Clique and shifted power to younger, more aggressive engineers outside Montreal.

As early as 1904, Professor McLeod called attention to his increasing work load and recommended the appointment of a full-time Secretary.[81] Although few were openly critical of McLeod's performance,[82] it was generally accepted that the Society urgently needed a full-time Secretary. The Montreal Clique concurred, but temporized, arguing that a qualified full-time Secretary was difficult to find and beyond the Society's means.[83] Nevertheless, in 1917, Fraser S. Keith, a thirty-nine year old McGill electrical engineering honours graduate, with a career background in manufacturing and technical journalism,[84] succeeded McLeod as the CSCE's first full-time Secretary. Keith was an important factor in the CSCE's transformation. He was energetic, articulate, aggressive and a strong believer in raising the engineer's status through public service. He represented the younger generation of engineers who were impatient for improved status. Although the Secretary's power had been reduced (he could no longer vote on Council), Keith easily compensated by enthusiastically preaching the new orthodoxy of public service on frequent speaking tours to the branches and through the editorial columns of the Society's new journal.

Until 1918 the CSCE did not have its own journal. Professional papers were published twice yearly in the Society's Transactions, together with its proceedings. Occasionally, outstanding papers were published as monographs.[85] Prior to 1918, Canada's leading engineering periodical was the Canadian Engineer, published by Biggar-Samuel and later by the Monetary Times organization.[86] The Canadian Engineer was an indepehdent, profit making technical newspaper, in many respects comparable to the American Engineering News-Record, or even the British Engineer, but it was dissimilar to the Canadian Contract Record and Electrical News in that the former was mainly concerned with business and construction, while the latter represented the electrical industry. The Canadian Engineer was interested in civil, especially municipal, engineering and published a wide range of trade and professional news of interest to civil engineers and contractors. Relations between the CSCE and the Canadian Engineer were friendly[87] and, although no formal agreement existed between them, the Canadian Engineer, in effect, served the CSCE for a time as a kind of unofficial surrogate journal, sympathizing with its objectives and publishing its notices on a regular basis.

By 1918, amid proposals in Council to take over the Canadian Engineer as the Society's official organ,[88] the CSCE founded its own periodical, the Engineering Journal. The new journal provided the CSCE with the means to unite the profession and create a professional identity. It kept members informed of Society business on a monthly basis; raised important professional issues; encouraged member participation through written submissions and published professional papers and practical information.[89] Under Fraser S. Keith's capable editorship, the Engineering Journal became the leading engineering journal in Canada.

Changing the CSCE's name was undoubtedly the Committee on Society Affairs' most controversial recommendation. The CSCE, like the ICE and the ASCE, had been organized to include all branches of engineering. The word "civil" was adopted before it lost its original meaning — to distinguish non-military engineers — and before mining, mechanical, electrical and chemical engineering had become distinct specialties.[90] Many members felt that the Society's name was a misnomer, that it narrowed the Society's scope and deterred many non-civil engineers from joining,[91] a condition inconsistent with the Society's broadened outlook and desire to consolidate the profession. Although the majority of members were civil engineers, they wanted to modernize the name by dropping the word "civil".[92]

In examining this question, the Committee on Society Affairs was motivated by the desire to create a single strong engineering society, embracing all qualified engineers in Canada. In their view

> The engineering field in Canada is not and will not be for many years to come broad enough to support more than one large and successful professional association. It appears to us that an association embracing all classes of Canadian engineers would have a much wider and stronger influence in Canada than an association composed of civil engineers with a small number of mechanical, mining, electrical or other engineers, and which would no doubt have in competition with its branches of other societies whose interests would naturally lie outside the interests of this society.[93]

While many Committee members were opposed at first to changing the name,[94] they were persuaded that it was an impediment to the Society's progress. Accordingly, they proposed what they considered to be a more dignified and professional name, acceptable to all engineers — THE ENGINEERING INSTITUTE OF CANADA (EIC).[95] Following Council's approval, a letter ballot was issued to members, along with a circular outlining the merits and demerits of the proposal. The membership unanimously endorsed the name change at the Annual Meeting in January, 1918, and a special Bill, amending the CSCE's charter, was passed by Parliament and given Royal Assent on 25 April, 1918.[96]

V

The change of name was more than a symbolic gesture. It had important implications. To the Contract Record, it signified "an entire revision of character"[97] and for H.H. Vaughan, the EIC's first President, it was an "attempt to unite all engineering in Canada" with the EIC.[98] Mining engineers, however, were less impressed. The Canadian Mining Journal, for example, believed that the new name was imprecise and regressive,[99] and F.W. Gray, Editor, the Mining Society of Nova Scotia, called the idea "slightly grandiose and impractical".[100] To other mining engineers, the name change concealed sinister and ulterior motives. Quoting the Committee on Society Affairs' Circular, the CMI's Monthly Bulletin contended that the EIC's real intention was to become the sole engineering society in Canada, at the expense of the CMI.[101] According to H. Mortimer-Lamb, the name change revived an old plot to secure legislation compelling all engineers to belong to the EIC in order to practise.[102]

While mining engineers were ultimately correct in maintaining that the name change would lead to legislation restricting practice, it was not at that point official EIC policy. The Committee on Society Affairs refused to deal with the issue[103] and the Council, preoccupied with digesting the new organizational changes, had not yet committed itself to political action. The EIC regarded the mining society as a trade body and did not consider it detrimental if its professional members also belonged to a professional society.[104] Several prominent CMI members, notably Professor Haultain, were members of both societies.

Although the EIC did not intend to take over the CMI, it had no reservations about absorbing the foreign branches of American engineering societies located in Toronto.[105] By 1918, The American Society of Mechanical Engineers (ASME) and the American Institute of Electrical Engineers (AIEE) began to expand. The ASME imprudently attempted to take over the EIC's mechanical engineering section and the AIEE's New York office had received more membership applications from Toronto than anywhere else in North America.[106] These developments alarmed the EIC. Adhering to the Committee on Society Affairs' recommendations, it was determined to represent all engineers and establish itself as the only national engineering society in Canada. The EIC considered the expansion of the American branches as an unwarranted foreign intrusion into Canadian engineering affairs; a challenge to its prerogatives. President Vaughan declared that, while it was acceptable for Canadian electrical and mechanical engineers to belong to foreign societies for legitimate professional reasons, it was their "duty"[107] to first join the national society of the country in which they earned their living. Foreign society membership, he maintained, should be complimentary to, not a substitute for, Canadian membership. It should follow, rather than precede EIC membership.[108] Using his influence as a former ASME vice-president, Vaughan secured a special agreement from the secretaries of the major American engineering societies, at a meeting in New York. The American societies agreed that they would not expand in Canada and would encourage their Canadian members to join the EIC.[109] This agreement effectively stopped the expansion of American engineering societies in Canada and formed the basis of a continuing 'understanding' between Canadian and American engineers.[110]

Having checked the spread of the American branches, the EIC then attempted to absorb them. Declaring that one large engineering society could serve engineers better than several smaller ones, EIC officers tried to persuade ASME and AIEE members in Canada to form mechanical or electrical sections within EIC branches, or, join an EIC branch as special 'affiliate' members.[111] Unfortunately, the American branches did hot have the constitutional authority to affiliate with EIC branches and most of their members preferred to retain their ASME or AIEE memberships, in order to keep informed of the latest American practices. Even the EIC admitted that it was not a substitute for specialized societies like the AIEE.[112] As well, many ASME and AIEE members in Canada probably feared the loss of their identity in a larger, predominantly civil engineering society.[113] Nevertheless, while the EIC did not absorb the American branches, it did contain them[114] and reserved for itself the distinction of being a single national engineering society with the potential to represent all fields of engineering. British and American engineers, the EIC boasted, had not achieved this.

Toward the end of the war, EIC members began to experience greater self-confidence and a heightened sense of purpose. According to Fraser S. Keith, engineers had entered a "new era. The star of the engineering profession has risen above the horizon", he declared, "it is well on its upward path of glory and eminence".[115] Society was awakening to the engineer's potential. It was time for engineers to assert themselves and to assume their rightful place in society by playing an important social role with their unique expertise. The key was professional unity and collective action. The name change would broaden the Institute's professional appeal;

build a strong united engineering society and create a "tribal soul". While the dramatic changes, initiated by the Committee on Society Affairs, stopped short of political action, they had articulated the philosophical principles and laid the institutional foundations upon which more radical changes would be made. Meanwhile, the EIC began to develop other strategies to raise the engineer's status by increasing public awareness of his contribution to society.

NOTES

[1] "It must be confessed", admitted John Galbraith in his President's Address, "after an existence of 21 years, that the Canadian Society has not succeeded in gaining recognition by the various classes of engineers in the country as the representative and authoritative engineering society ..." "President's Address" (John Galbraith), *Trans CSCE* XXIII (1909) p. 110.

[2] EIC Scrap Books, "C.H. McLeod", 10 Sept. 1903; CSCE, Toronto Branch Papers, Box #4, "Meeting at Engineers' Club — Discussion", 5 Feb. 1917, p. 42; EIC Letter Books, Letter to Galbraith, 27 Feb. 1900, p. 154; *Ibid.*, Letter from C.H. McLeod, 11 Dec. 1898, p. 482; "Report of Annual Meeting", *Trans CSCE* XXVI (1912) p. 72. Not all engineers believed that CSCE papers were below international standards. See, for example, the remarks of the City Engineer of Hamilton: E.B. Barrow to Editor, *Contract Record*, 28 (27 Mar. 1913) pp. 46-47.

[3] Unsigned Letter to Editor, *Canadian Engineer*, 15 (6 Mar. 1908) p. 149.

[4] See, for example, "President's Address" (John Kennedy) *Trans CSCE* XVII (1893) p. 14; EIC Scrap Books, Circular by John Galbraith, 12 June, 1908; "President's Address" (Phelps Johnson) *Trans CSCE* XXVIII (1914) pp. 103-104; Also see: EIC Letter Books, A. Macdougall to P. Gilpin, 2 Mar. 1893, p. 46.

[5] "Report of Council", *Trans CSCE*, XI (1897) p. 12; "Report of Annual Meeting" (H.H. Vaughan) *Ibid.*, XXVIII (1912) p. 53; EIC Letter Books, Letter to Galbraith, 27 Feb. 1900, p. 154.

[6] For example, between 1911 and 1914, an average of only one paper per 132 members was presented. See "President's Address" (Phelps Johnson) (1914) p. 103.

[7] "Report of Annual Meeting", *Trans CSCE* XXII (1908) p. 35; "President's Address" (G.H. Duggan), *Ibid.* XXXI (1917) p. 71.

[8] Commenting on the standard specifications for Portland Cement, compared with those issued by the American Society for Testing Materials, for example, the Canadian Engineer in 1908 lamented that the "comparison does not reflect any great credit on the Canadian Society". "The Canadian Society of Civil Engineers", Canadian Engineer, 15 (23 Oct. 1908) p. 758. Also see, Unsigned Letter to Editor, Contract Record, 27, n. 9 (26 Feb. 1913) p. 43.

[9] "Report of Annual Meeting", Trans CSCE XXVI (1912) p. 71.

[10] EIC Scrap Book No. 4, Circular by John Galbraith, 12 June, 1908.

[11] "Report of Annual Meeting", Trans CSCE, XXII (1908) p. 9.

[12] Toronto Branch Papers, Box #4, A.N. Worthington to E. Oliver, 19 Feb. 1917.

[13] Andrew Charles Gross, "Engineering Manpower in Canada", (Unpublished Ph.D. dissertation, Ohio State University, 1968) p. 50, Table 7b.

[14] EIC Scrap Book No. 4, Circular by Committee on Society Affairs, 7 Nov. 1917.

[15] "The British Columbia Engineer and His Problems", Contract Record 27 (19 Oct. 1913) p. 39. Similar regional antagonisms also developed within the ASME. For an analysis of the 'New York' problem, see: Bruce Sinclair, A Centennial History of the American Society of Mechanical Engineers, 1880-1980, (Toronto, 1980) pp. 65-67, 85, 93, 184-186.

[16] Of 663 civil engineers, approximately 300 were CSCE members. Canada, Department of Trade and Commerce, Sixth Census of Canada, 1921, Vol. IV (Ottawa, 1927) Table 4, pp. 158, 184; "Retiring President's Address", (J.M.R. Fairbairn), Engineering Journal V (Feb. 1922) p. 96.

[17] "Report of Annual Meeting", Canadian Engineer 34, (7 Feb. 1918) p. 122.

[18] See Dean Galbraith's remarks before the Winchester Inquiry. "Minutes of Evidence", The Royal Commission of the Alleged Employment of Aliens in Connection with the Surveys of the Proposed Grand Trunk Pacific Railway, Report of the Commission and other Documents", in Canada, House of Commons, Sessional Papers (1905) No. 35a, p. 513.

[19] "Peterborough Branch", Jour EIC IV (June, 1921) pp. 371-372; University of Toronto Archives [hereafter cited: UTA], Haultain Papers, B 47 (B-72-005) Box #4, Fraser S. Keith, "Engineering Education", 8 May, 1924, p. 7.

[20] F.W. Wetmore to Editor, Contract Record, 27, n. 10 (5 Mar. 1913) p. 67.

[21] See Chapter II, pp. 58-60.

[22] Edit. "Protection for Engineers", Canadian Engineer, 14 (14 Feb. 1908) p. 112.

[23] Ibid.

[24] In 1913, although the Contract Record observed that many prominent CSCE members had openly criticized the Society in signed letters to the Editor, there was also an unprecedented number of unsigned letters — presumably from engineers with career interests to protect — equally critical of the CSCE.

[25] See eg. Wm. P. Anderson to Editor, Contract Record, 27 (12 Mar. 1913) p. 48; "Report of the Annual Meeting", Trans CSCE XXVIII (1914) pp. 112-113.

[26] "Report of Annual Meeting", Ibid., XXII (1908) p. 35; E.A. Stone to Editor, Contract Record, 27, n. 15, (9 Apr. 1913) p. 71. Apathy had developed to the point where a committee, charged with discovering means to increase the Society's usefulness, in 1909, was unable to

make recommendations, because it received only seventeen replies to a circular soliciting suggestions. "Report of Committees", Trans CSCE XXIII (1909) pp. 36-40.

[27] "Report of Annual Meeting", Ibid., XXIV (1910) p. 41; "President's Address" (Phelps Johnson) p. 105. Both the Canadian Engineer and the Contract Record were disappointed and scorned this position. Edit. "C.S. of C.E.", Canadian Engineer, 15 (10 July, 1908) p. 489; Edit. "Work and Status of the Canadian Society of Civil Engineers", Contract Record, 27, n. 9 (26 Feb. 1913) p. 37.

[28] "Report of Committees", Trans CSCE XXIII (1909) p. 51.

[29] Each section was headed by an appointed officer who presided at meetings held in Montreal. Papers read and discussed at these meetings were published by the Society, if approved by the Committee on Papers. Believing that Canada was not large enough for more than one engineering society, CSCE leaders thought it difficult to separate the various branches of engineering and that overlapping and cross-fertilization was the norm among all specialties, especially mining engineering. "President's Address" (Wm. Anderson), Ibid. XIX (1905) p. 24; Council Minutes, 9 June, 1903, p. 274; C.H. McLeod "How Canadian Engineers Organize", Canadian Engineer 32 (19 Apr. 1917) p. 342.

[30] J.G.G. Kerry, "The Past", Engineering Journal XXX (1947) p. 370.

[31] See: Canadian Society of Civil Engineers, Constitution for Proposed Canadian Society of Civil Engineers, (Ottawa, 1886) secs. 33-37.

[32] C.H. Mitchell, Chairman, Toronto Branch, for example, doubted that the Nova Scotia Society of Engineers would have been organized if the branches were fostered earlier. (C.H. Mitchell, "Inaugural Address, Toronto Branch", Canadian Engineer, 15 [6 Mar. 1908] p. 151) For background on these Societies, see: "Nova Scotia Society of Engineers", Ibid. 14 (8 Mar. 1907) p. 51; "Nova Scotia Society of Engineers", Contract Record, 25 (25 Oct. 1911) pp. 51-52; "The Engineering Society of Regina", Ibid. 27 (15 Jan. 1913) pp. 64-66.

[33] The differences were usually minor. In some branches, junior members could vote and, in Vancouver, in order to give everyone a chance to hold office, the Chairman and Vice-Chairman could only hold office for one year. See eg. "St. John Branch", Jour EIC, IV (June, 1921) p. 377; "Tenth General Professional Meeting", Ibid.

[34] The Halifax and Peterborough Branches, founded 1918 and 1919, respectively, were out growths of the Nova Scotia Society of Engineers and the Peterborough Engineers' Club. Under CSCE By-Laws, it was not possible for the Society to take over existing organizations. Thus existing societies had to disband, before a branch could be organized. "Formation of New Branches", Jour EIC, 1 (May, 1918) p. 63; F.A. Bowman, "Engineering Progress in Nova Scotia", Ibid., III (July, 1920) p. 348; EIC Papers, Thomas A. Hay to H.T. Bovey, 12 Apr. 1887; "Engineering Gathering at Peterborough", Jour EIC, II (Dec. 1919) p. 779; "Report of the Council", Ibid. III (Feb. 1920) p. 72.

[35] See eg.: Toronto Branch Papers, Box #4, H.H. Vaughan to C.B. Hamilton, 26 June, 1918; C.H. McLeod, "How Canadian Engineers Organize", p. 341.

[36] Council, not the membership, approved of the formation of new branches, along with their By-Laws. Although branches were permitted to increase revenue by the collection of branch dues and also through affiliate members' dues, the CSCE ultimately controlled branch finances — and thus the branches — through branch rebates. By-Laws of the Canadian Society of Civil Engineers, (1905) s. 49.

[37] See eg.: "By-Laws Toronto Branch Engineering Institute of Canada" in Toronto Branch, Engineering Institute of Canada, Yearbook, (1919) sec. I, p. 13.

[38] Since 1905, the ASCE periodically authorized the formation of "Associations of Members of the A.S.C.E." or "Local Sections", as they became known in 1921. The Local Sections were designed to meet the professional needs of members on the local level and further the aims of the parent Society. They were given formal status in 1921. Although the Associations held regular meetings and read papers, they were not full-fledged formally structured branches, comparable to the CSCE branches. cf. William H. Wisely, The American Civil Engineer, 1852-

1974, (New York, 1974) pp. 48-51, 409; "President's Address" (Phelps Johnson) p. 105. CMI By-Laws also made provision for the establishment of "local branches or sections", in mining camps, towns or districts, wherever there were sufficient members. "By-Laws of the Canadian Mining Institute", Quarterly Bulletin of the Canadian Mining Institute, No. 11 (June, 1910) sec. 54, pp. 228-229.

[39] Although branches found other means to augment their revenue, they were usually in financial trouble. Toronto Branch Papers, Box #7, F.S. Keith to W.S. Harvey, 3 Mar. 1919; R.O. Wynne-Roberts, "Questions of policy for Engineering Institute of Canada", Canadian Engineer, 39 (7 Oct. 1920) p. 415.

[40] With 157 members in 1911, the Ottawa Branch became the largest in the CSCE. "President's Address" (G.H. Duggan) Table No. 4, p. 78.

[41] "Annual Report", Ibid. (1890) p. 46; Council Minutes, 5 May, 1891, p. 68; "Minutes Annual General Meeting" 12 Jan. 1892, p. 82; "Report of the Annual Meeting", Trans CSCE VII (1893) p. 4.

[42] On the re-establishment of the Branch, see: "First Annual Report of the Toronto Branch Canadian Society of Civil Engineers, to 31 December, 1907", Ibid. XXII (1908) pp. 31-32; Council Minutes, 13 Feb. 1906, pp. 74-75.

[43] "Report of the Toronto Branch for the Year 1913", Trans CSCE, XXVII (1914) p. 96; Toronto Branch Papers, Box #4, "Meeting at Engineers' Club", 5 Feb. 1917, p. 7.

[44] See supra, Chapter II, p.72, n.31. Relations between the Toronto Branch and the Engineers' Club were amicable. An attempt had even been made to establish the Engineers' Club as a CSCE Branch. "Inaugural Address, F.L. Sommerville", Canadian Engineer, 13 (2 Feb. 1906) p. 66; "Report of the Annual Meeting", Trans CSCE XXI (1907) p. 6; "Council Minutes", 11 Apr. 1905, p. 32; "Engineers' Club of Toronto Will Not Amalgamate", Canadian Engineer, XII (5 May, 1905) p. 139.

[45] Fraser S. Keith, "Awakening Recognition of the Engineer", Contract Record, 31 (21 Nov. 1917) p. 953; CSCE Toronto Branch Papers, Box #5, "Minutes of a Special Meeting of the Ottawa Branch", 21 Feb. 1918, (John Murphy quoting a speech by W.F. Tye), p. 3.

[46] Canadian engineers related their discontent to a larger world-wide feeling of unrest among British and American engineers over low status. Keith, "Awakening Recognition of the Engineer", p. 953.

[47] Francis, "Engineering as a Profession", p. 134; Cecil B. Smith, "The Relation of the Engineer to the Community", Canadian Engineer, 16 (23 Apr. 1909) p. 545.

[48] Edit. "The Status of the Engineering Profession", Canadian Engineer, 17 (12 Nov. 1909) p. 527; C.E.W. Dodwell to Editor, Ibid. 34 (25 Apr. 1918) p. 362; C.E.W. Dodwell, "Engineers and Engineering", Jour EIC III (March, 1920) p. 143.

[49] Walter J. Francis, "Engineering as a Profession", Applied Science, New Ser. VIII (Oct. 1913) p. 134.

[50] "Engineers and Geologists" (H.E.T. Haultain), Canadian Engineer, 24 (3 Apr. 1913) pp. 525-526; "Discussion on Wielder of the Weapon" (P.A.N. Seurot), Trans CSCE XXVIII, (1914) pp. 514-515; "Discussion on Canada's Railway Problem" (A.V. Robinson), Ibid. XXXI (1917) p. 196. Engineers were even jealous of the alleged access CMI members had to Dominion Cabinet Ministers. See, Toronto Branch Papers, Box #4, "Meeting at Engineers' Club", p. 7.

[51] Council Minutes, 8 March, 1904, p. 310; Edit. "Engineering Help is Needed", Canadian Engineer, 33 (23 Aug. 1917) p. 169; Toronto Branch Papers, Box #4, S.G. Porter to C.H. McLeod, 4 Jan. 1917; "Engineers on Railway Commission", Jour EIC, IV (Jan. 1921) p. 34; "Report of Annual Meeting", Trans CSCE, XI (1897) p. 33, Ibid. XXV (1911) p. 143; Edit. "The Engineer and Boards of Health", Canadian Engineer, 18 (21 Jan. 1910) p. 47; Edit. "The Medical Health Officer and the Engineer", Ibid. 23 (19 Sept. 1912) p. 484; Edit. "The Public Health Act of Ontario", 24 (16 Jan. 1913) p. 180. Engineers

were furious that an engineer was not appointed to the Commission superintending the rebuilding of the destroyed section of Halifax. See: Toronto Branch Papers, Box #5, S.G. Porter to F.S. Keith, 19 March, 1918; Ibid., Keith to S.G. Porter, 22 Mar. 1918; Ibid. S.G. Porter to F.S. Keith, 3 April, 1918; UTA Haultain Papers, Box #1, Chairman Edmonton Branch to H.E.T. Haultain, 3 May, 1918.

[52] Edit. "Need for Active Service at Home", Canadian Engineer, 29 (22 July, 1915) p. 193; Edit. "Canadian Army Hydrographical Corps", Ibid. (14 Oct. 1915) p. 482; Edit. "Selection of Engineer Officers", Ibid. 30 (9 Mar. 1916) p. 337; Edit. "Conscription and the Engineer", Jour EIC 1 (June, 1918) pp. 91-92; Sapper to Editor, Ibid. II, (March, 1919) p. 226.

[53] "Editorial Notes", Canadian Engineer, 16 (12 Mar. 1909) p. 348; Cecil B. Smith, "The Relation of the Engineer and the Community", Ibid., p. 545; "Engineers and Newspaper Reports", Ibid. 19 (27 Oct. 1910) p. 547; "Discussion on Wielder of the Weapon" (F.B. Brown) p. 514.

[54] Peter Gillespie, a University of Toronto Engineering Professor, believed that only an engineer could write sympathetic biographies of Canadian engineers, after the fashion of Samuel Smiles. Toronto Branch Papers, Box #7, "Biographies of Engineers".

[55] Edit. "Public Appreciation of the Engineer in Relation to his Work", Contract Record 29 (7 July, 1915) p. 695.

[56] Edit. "The Epic in Engineering", Contract Record, 32 (14 Aug. 1918) p. 631. On the 50th Anniversary of Confederation, Sir Robert Borden offended many engineers by not acknowledging their contribution to Canada's material progress. Fraser S. Keith, "Awakening Recognition of the Engineer", p. 954.

[57] Francis, "Engineering as a Profession", Applied Science, p. 134.

[58] Ibid.

[59] For background on the formation of this important committee, see: Toronto Branch Papers, Box #4, "Meeting at Engineers' Club", pp. 3-4.

[60] For Haultain's assessment, see: UTA Haultain Papers, Box #4, Haultain to F.M. Lyle, 22 April, 1924.

[61] As Haultain put it, the CSCE had "magnificent foundations", all that was required was "to build the superstructure". Toronto Branch Papers, Box #4, "Meeting at Engineers' Club", p. 15.

[62] See esp. UTA Haultain Papers, H.E.T. Haultain, "The Romance of Engineering: A Luncheon Address", (Jan. 1922) p. 7; H.E.T. Haultain, "The Wielder of the Weapon", pp. 494-502, 517-518; Toronto Branch Papers, Box #4, "Meeting at Engineers' Club", pp. 10-12, 16-17, 50. Engineers earlier had noted a decided lack of esprit de corps among Canadian engineers. EIC Scrap Book, No. 3, Clipping Montreal Gazette, (24 Apr. 1905); "Report of Annual Meeting", Trans CSCE XXII (1908) p. 10.

[63] Edit. "Communion of Engineers", Canadian Engineer 29 (11 Nov. 1915) p. 577; A. MacDonald to Editor, Ibid. 32 (18 May, 1917) p. 432; Toronto Branch Papers, Box #4, "Meeting at Engineers' Club — Discussion" (R.O. Wynne-Roberts) pp. 34-35; "Cape Breton Branch", Jour EIC, IV (July, 1921) p. 424.

[64] Toronto Branch Papers, Box #4, "Meeting at Engineers' Club", p. 10.

[65] Ibid., p. 12.

[66] Ibid., p. 16.

[67] "Toronto Engineers Suggest Means of Increasing Prestige of the Profession", Contract Record, 32 (24 Apr. 1918) p. 326.

[68] R.O. Wynne-Roberts, "Engineering Prestige", Canadian Engineer 34 (18 April, 1918) p. 332.

[69] See: Edwin T. Layton Jr., The Revolt of the Engineers: Social Responsibility and the American Engineering Profession (Cleveland, 1971).

[70] Toronto Branch Papers, Box #4, "Meeting at Engineers' Club", p. 50.

[71] The implications of this change were not lost on some CSCE members. See eg. Toronto Branch Papers, Box #4, H. Wickstead to E. Oliver, 17 Feb. 1917.

[72] "Progress Report of Committee on Society Affairs", Trans CSCE, XXXI (1917) pp. 383-385.

[73] Engineering Institute of Canada, By-Laws of the Engineering Institute of Canada, (1919) sec. 1.

[74] "Canadian Society of Civil Engineers Broadens Out under New Name", Contract Record, 31 (26 Dec. 1917) p. 1050.

[75] C.H. McLeod, "How Canadian Engineers Organize", p. 341.

[76] "Retiring President's Address" (J.M.R. Fairbairn) pp. 94-95.

[77] Keith, "Awakening Recognition of the Engineer", p. 952.

[78] J.G.G. Kerry, "The Past", p. 370.

[79] The elective members of the Nominating Committee (six from Ontario and Quebec) nominated twenty-five Councillors — ten of whom were Montreal residents and the remainder from anywhere in Canada. Supra, Chapter II, pp. 59-60.

[80] For each district in which no branch existed, the Council appointed one member. By-Laws ... (1919) sec. 6.

[81] Council Minutes, 15 July, 1904, pp. 325-326.

[82] There were few exceptions, see eg. H.K. Dutcher to Editor, *Contract Record*, 27, n. 13 (26 Mar. 1913) p. 47.

[83] W.F. Tye to Editor, *Ibid*. 27, n. 9 (26 Feb. 1913) p. 40; Wm. Anderson, *Ibid.*, n. 11 (12 Mar. 1913) p. 48.

[84] "The New Secretary for the Canadian Society of Civil Engineers", *Canadian Engineer*, 32 (8 Mar. 1917) p. 222.

[85] W.F. Tye's *Canada's Railway Problem*, for example, was a sophisticated polemic against railway nationalization by the war time Borden Government, while H.H. Vaughan and C.H. Duggan wrote on Canadian munitions productions, (*The Manufacture of Munitions in Canada*) and a study of the Quebec Bridge, respectively.

[86] There were other technical periodicals published during this period. One of the most remarkable was *Applied Science*, published by undergraduates of the Faculty of Applied Science and Engineering, University of Toronto, under various titles since 1886. In addition to student papers, this journal also published addresses by prominent Canadian engineers — usually alumni — on subjects relating to engineering professionalism. For brief historical surveys, see: T.H. Hogg, "The Engineering Society University of Toronto", *Applied Science*, New Ser. 2 (Feb. 1909) p. 169; Edit. "Revival of an Undergraduate Engineering Publication", *Canadian Engineer*, 40 (5 May, 1921) p. 447; Peter Gillespie, "Forty Years of the Engineering Society", *University of Toronto Monthly*, XXII (5 Feb. 1922) p. 207.

[87] EIC Letter Books, C.H. McLeod to R.W. King, 17 Oct. 1900, p. 450; 25 Oct. 1900, p. 473; McLeod to E.B. Biggar, 25 Oct. 1900, p. 477; McLeod to E.H. Keating, 11 April, 1902, p. 729.

[88] Council Minutes, 31 Oct. 1917, p. 79; *Ibid.*, 18 Dec. 1917, pp. 90-91.

[89] Published on a monthly basis, this journal was originally entitled the Journal of the Engineering Institute of Canada. For a brief overview of its progress, see: "40 Years of Publication, 1918-1958", Engineering Journal, 41 (April, 1958) pp. 135-136. Prior to its publication, the CSCE issued a monthly Bulletin for a number of years beginning in 1907, which published the Society's notices and similar business.

[90] Edit. "The Organization of Canada's Technical Men", Electrical News, 26, n. 6 (15 Mar. 1917) p. 10. EIC Letter Books, C.H. McLeod to R.W. King, 1 Nov. 1900, p. 499. The classification of courses by engineering schools and popular usage by corporate and government employers, as well as the growth of specialized engineering societies, were the general reasons cited for the specialized usage of the word "civil". See "Report of Annual Meeting", Trans CSCE, XVI (1902) p. 19; Ibid. XVII (1903) p. 71; EIC Scrap Book No. 6, Committee on Society Affairs, "Circular", 7 Nov. 1917.

[91] Toronto Branch Papers, Box #4, "Meeting at Engineers' Club — Discussion", pp. 17, 19. Some members had always believed that the term "civil" engineer was too exclusive. See, eg. Comments of J. Sproule, Canadian Engineer, 111 (2 June, 1895) p. 43.

[92] This represented a significant change of opinion within the CSCE. In 1903, a committee, appointed to investigate changing the Society's name, recommended against any change, since the majority of replies to its circular, proposing to drop the word "civil", were negative. "Report of the Annual Meeting", Trans CSCE, XVI (1902) p. 19; Ibid. XVII (1903) pp. 70-71.

[93] EIC Scrap Book No. 6, Committee on Society Affairs "Circular", 7 Nov. 1917.

[94] Ibid.

[95] The Committee favoured the use of the word "Engineering", since it was broader in scope than the word "Engineer" and less likely for the public to confuse the Society with locomotive drivers and plumbers. The word "Institute" was preferred to "Society", since it did not have the same fraternal or benevolent society

connotations. In short, the Committee thought that the new name was more professional. (Ibid.) Some mining engineers, however, held the opposite view. Edit. "Civil Engineers Change Name of their Society", Canadian Mining Journal, XXXIX (1 Feb. 1918) p. 32.

[96] Edit. "The New Name", Jour EIC, 1 (May, 1918), p. 60; Council Minutes, 13 Oct. 1918, pp. 78-79.

[97] Edit. "The Significance of the Engineering Institute of Canada", Contract Record, 32, n. 1 (2 Jan. 1917) p. 1.

[98] "The President's Address" (H.H. Vaughan), Jour EIC, 1 (May, 1918) p. 1. Some observers compared the EIC's new aspirations for professional unity with the formation of the Engineering Council in the United States. See, Edit. "Significance of the Engineering Institute of Canada", Contract Record, 32, n. 1 (2 Jan. 1917) p. 1. "Canadian Society Becomes Institution", Engineering News-Record, 80 (21 Feb. 1918) p. 340.

[99] Edit. "Civil Engineers Change Name of their Society", p. 32.

[100] Gray doubted whether the EIC had improved its prospects or status by attempting to combine all fields of engineering in one society, since one society could not serve the specialized needs of all engineers. Pointing out that a technical society existed for the advancement of learning, Gray asserted that the attempt to improve the status of engineers was a "selfish ideal and not in its essence distinguishable from trade unionism", F.W. Gray to Editor, Canadian Mining Journal, XXXIX (1 Dec. 1918) p. 401.

[101] Edit. "A Rose By Any Other Name Etc.", Canadian Mining Institute Monthly Bulletin, No. 70 (Feb. 1918) pp. 83-84.

[102] "Address by the Secretary", Ibid., no. 76 (Aug. 1918) p. 721.

[103] "Canadian Society of Civil Engineers Broadens Out Under New Name", p. 1050.

[104] The CMI would have disputed this since the majority of its members were professionals. Their suspicions about the name change were reinforced by memories of the CSCE's periodic attempts to obtain restrictive provincial licensing powers — a measure the CMI always believed would destroy their organization.

[105] Although the American Institute of Electrical Engineers had established a branch in Toronto before 1914, it was not until 1917 that a group of Canadian mechanical engineers went to New York to arrange for the establishment of an ASME branch for Toronto. (H. Elizabeth Fisher, "Professional Associations in Canada" [Unpublished Ph.D. Dissertation, University of Toronto, 1932] p. 174). Apart from an unsuccessful attempt, in 1916, to organize Michigan and Ontario into an ASCE branch, no ASCE branches were organized in Canada. Council Minutes, 21 Nov. 1916, p. 441; 23 Nov. 1916, p. 443; Toronto Branch Papers, MS 102, Box #3, C.H. McLeod to L. Arkley, 30 Oct, 1916; Ibid., Box #7, Letter to F.B. Brown, 26 Feb. 1921.

[106] Ibid., Box #5, C.B. Hamilton to F.S. Keith, 3 June, 1918; H.H. Vaughan to P. Gillespie, 26 June, 1918.

[107] Ibid., Vaughan to Hamilton, 26 June, 1918.

[108] Ibid.

[109] Ibid., F.S. Keith to George Hogarth (confidential), 25 June, 1918; Vaughan to Gillespie, 26 June, 1918; Council Minutes, 26 June, 1918, pp. 63-64.

[110] "Report of Thirty-Fourth Annual Meeting", Jour EIC III (Mar. 1920), p. 114; "Retiring President's Address" (R.A. Ross), IV (March, 1921) p. 202.

[111] Toronto Branch Papers, MS 102, Box #5, F.S. Keith to C.B. Hamilton, 6 June, 1918; Vaughan to Gillespie, 26 June, 1918; Vaughan to Hamilton, 26 June, 1918; Gillespie to Vaughan, 2 Dec. 1918; Gillespie to E.V. Pannell, 21 Dec. 1918.

[112] Ibid., Box #6, Pannell to Gillespie, 12 Dec. 1918; (Copy), Council Minutes, 17 Dec. 1918, p. 1;

"American Engineering Societies in Canada", *Canadian Engineer*, 36 (13 Feb. 1919) p. 221; Toronto Branch Papers, MS 102, Box #5, Vaughan to Hamilton, 26 June, 1918; "Report of Thirty-Third Annual Meeting", *Jour EIC* II (March, 1919) p. 164.

[113] Edit. "A Canadian Institute of Electrical Engineers", *Electrical News*, 28 (1 May, 1919) p. 25.

[114] Ironically, the EIC was then in peril of being absorbed by the powerful American parent societies, centred in New York. These organizations were anxious to unite the profession and repeatedly attempted to involve the EIC in various schemes of international affiliation. The EIC, however, struggled to maintain its independence by scrupulously cultivating friendly relations with the Americans, while politely deferring membership in organizations such as the Engineering Council and, later, the Federated American Engineering Societies. Toronto Branch Papers, MS 102, Box #6, Minutes of Council (copy), 17 Dec. 1918, p. 1; "The Bon Entente", *Jour EIC* I (Dec. 1918) pp. 402-403; edit. "Joint Committee on International Affiliation", *ibid*. II, (April, 1919) p. 335; Committee on International Affiliation III (Feb. 1920) p. 52; M.E. Cooley to F.S. Keith, *Engineering Journal* V (Feb. 1922) p. 88; Council Minutes, 25 Sept. 1922, p. 78.

[115] Keith, "Awakening Recognition of the Profession", p. 956.

Chapter VII

"THE PROPER KIND OF PUBLICITY"
THE QUEST FOR PUBLIC RECOGNITION

Following the momentous 1917 report of the Committee on Society Affairs, the EIC adopted limited social goals and tried to raise the profession's status through public service. This was attempted without government assistance and paralleled similar action by British and American engineering societies. The EIC hoped that public service would not only enhance its prestige, but also help to solve engineers' economic problems and equip them with an elite social role.

I

By 1914, Canadian engineers began to realize that their lack of status arose, in part, from their failure to communicate with the public.[1] They believed that this stemmed from their inability to express themselves,[2] as well as their aversion to publicity. While some engineers, such as T.C. Keefer, knew the value of publicity and were accomplished propagandists, others, particularly older engineers, were suspicious and distrusted the press.[3] They believed that it was morally suspect, the device of demagogues and radicals. They were certain that it ignored their achievements, yet sensationalized the slightest mistake or controversy surrounding government engineering. In their view, this bias often distorted the public perception of their work and sometimes ruined professional reputations.[4] Outstanding work, they contended, required no publicity.

In spite of this sentiment, some engineers believed that publicity could be beneficial. For Professor Haultain, "the proper kind of publicity",[5] or balanced unsensational press reports could educate the public to the social importance of engineering and raise the engineer's status. "Engineering", remarked the Canadian Engineer, "is scarcely likely to command the place in the public esteem which its importance warrants until the public is brought to realize the far-reaching effects of the services rendered by technical men."[6] Just as other professions, such as law, had effectively used publicity to increase their prestige, many engineers argued that they must utilize their superior powers of reasoning and learn to communicate with laymen.[7] Following the war, the EIC urged its members to publicize their work, in order to stimulate popular interest in engineering. They were encouraged, as private individuals, to supply newspaper and magazine editors with interesting popular articles and editorial material on engineering, in addition to giving public lectures.[8] They were also advised to seek public office and to join local business and service organizations as a means of presenting the engineering viewpoint.[9]

The resolve to stimulate popular interest in engineering was not a cynical attempt to manipulate public opinion. Engineers saw their task as public education, not propaganda. Viewing publicity from a narrow elitist perspective, they believed that only engineers were capable of understanding and explaining technology.[10] They naively assumed that, once the public was credibly informed about their achievements, they would enjoy greater prestige.

II

Publicity, however, was only an essential first step to higher status; public service was the primary means. Enhancing the engineer's prestige, through public service, had become a well established practice before the Committee on Society Affairs recommended that it become official policy in 1917.

During the First World War, one important public service initiative was to promote the need for industrial efficiency through research. Warning of the danger of German economic domination after the war, the CSCE stressed the need for industrial research. Before the war, it argued, Germany aggressively established many science-based industries through the clever use of synthetics. These industries quickly became monopolies and left Britain and her allies dependent on certain German chemical, electrical and glassware commodities.[11] As Germany's military subjugation would not necessarily destroy her formidable industrial potential, engineers predicted that a fierce economic struggle would follow the war. "The present war", asserted the Contract Record in 1916, "is a mighty effort by Germany to gain not only a military, but also a commercial supremacy ... Tomorrow the military struggle will end and then the real and permanent business of nations will begin — industrial war."[12]

The struggle for commercial supremacy, after the war, would be determined by industrial efficiency. The key to efficiency was research — Germany had proven that.[13] Canadian industry, engineers contended, was uncoordinated and inefficient. Little research was done[14] because conservative-minded manufacturers relied on tariffs and patent laws, instead of science, for industrial development.[15] Foreign competitors were fully committed to state-assisted industrial research.[16] Engineers observed that the United States had not only established a Naval Consulting Board, but was acquiring commercially useful German technology by confiscating its patents and industrial assets in the United States.[17] If Canada hoped to compete after the war and to take advantage of the war-time isolation of German trade, science, industry and government must cooperate. Canada had no alternative.

As universities were viewed primarily as teaching institutions and industry was considered to be unwilling or unable to conduct research, the EIC concentrated its efforts on persuading the Dominion Government to promote research. They recognized that it was the only organization with the means. In the summer of 1916, for instance, five prominent CSCE members presented a memorandum to Sir Robert Borden that outlined the need for planned industrial development and recommended the establishment of a national testing laboratory.[18] This initiative was followed by a meeting with Sir George Foster, Minister of Trade and Commerce and acting Prime Minister.[19]

Near the end of 1916, as the voluntary and private nature of Canada's war mobilization gave way, under the stress of war, to coercion and the intervention of the state in nearly every aspect of public and private life,[20] the government created a Cabinet Committee on industrial research. On 6 June, 1916, in response to pressure from engineers, scientists and some industrialists, a Sub-Committee of the Privy Council on Scientific and Industrial Research was appointed by Order-in-Council, with provision for an advisory council.[21] The members of the Honorary Advisory Council for Scientific and Industrial Research — including prominent engineers, scientists and some businessmen — were appointed on 29 November, 1916,[22] and given authority to study and co-ordinate research in Canada.[23]

III

The EIC's advocacy of industrial research was typical of its approach to public service; it was inclined to be more opportunistic than altruistic. In spite of a genuine concern for industrial efficiency, the EIC was primarily interested in publicizing the need for industrial research for its prestige value. It was only partially committed to the idea and did comparatively little to advance the cause. Its arguments were superficial and unoriginal, mostly borrowed from British and Canadian scientists.[24] Apart from some representations to government, it followed the lead set by scientists — the real champions of industrial research.

By 1914, for example, the Royal Canadian Institute (RCI), Canada's oldest surviving scientific society,[25] founded a "Bureau of Scientific and Industrial Research" as a private research agency. Its purpose was to apply science to industry by means of "Industrial Fellowships",[26] modelled after the highly successful system of a Canadian, Dr. Robert Kennedy Duncan, at the University of Kansas and the Mellon Institute of Industrial Research.[27] By 1916, senior RCI officers had assumed the leadership of the Honorary Advisory Council (which became the National Research Council) to carry forward the Bureau's work as a public enterprise.[28] At this point, the CSCE pledged its support,[29] while it continued to espouse the need for research as its own cause, in order to improve the CSCE's status. Referring to the Memorandum on National Industrial Development, for example, Fraser S. Keith informed members that the society had "an opportunity of increasing the prestige of the Canadian Society of Civil Engineers that should not be overlooked ..." and urged members to give it maximum publicity.[30]

While engineers were as public spirited as most Canadians, confronted with more immediate economic problems, their altruism had become tempered with pragmatism. By 1918, civil engineers were in the midst of a developing crisis. Before the war, civil engineering was the dominant form of engineering in Canada; but, after the completion of major railway and public works, between 1908 and 1916, civil engineering was on the decline.[31]

With the rise of new science-based industries during the war, electrical, chemical and mechanical engineering displaced civil as the major engineering activity. By 1921, civil engineers comprised only forty-three percent of the professional engineers in Canada. By 1931, their ranks had declined to 38.4 percent and 22.2 percent in 1941.[32] These changes were soon reflected in course enrolments in the engineering schools.[33]

Although employment prospects for industrial engineers were good, the future looked bleak for civil engineers. The field was already overcrowded and the demand for them was decreasing when the supply, in proportion to available jobs, was increasing. War-time retrenchment by public works departments had already caused widespread unemployment. As well, the influx of nearly one thousand returned soldiers, combined with other engineers from domestic war-related engineering work, exacerbated the problem and generated anxiety among returning soldiers. "... [y]ou cannot realize the state of mind that men will get into", Colonel A. McPhail wrote in 1919 to H.H. Vaughan, President of the EIC, "when they are sitting down here in France waiting for orders to return to Canada ... without any information on prospects for the future ..."[34] Towards the end of the war, the EIC attempted to relieve some of these anxieties.

As early as 1898, the CSCE had kept a register of engineers seeking employment. But it was not until 1918 that the EIC established a full-fledged employment bureau that served as a kind of "clearing house" for engineers and employers.[35] It operated efficiently through the Engineering Journal and branch secretaries and primarily benefitted younger engineers. But, in spite of its popularity, its major shortcoming was that it ultimately depended on the EIC's senior employing engineers.[36]

Engineers were often forced to use other methods to find employment, sometimes by reviving public works-related activities, curtailed by the war and pre-war depression. One example was town planning. After engineers had overcome their suspicions that town planners were trying to monopolize the field at their expense, they became enthusiastic town planning supporters.[37] The Toronto Branch became one of the most active town planning agencies in Canada and, in 1919, engineers joined forces with architects and surveyors to found the Town Planning Institute of Canada. In these undertakings, engineers, like surveyors, were motivated primarily by the prospects of new employment opportunities.[38]

Similarly, the CSCE's promotion of industrial research (a continuation of its pre-war efforts to obtain a national testing laboratory)[39] was also partly an attempt to create professional employment. While supplying costly technical information to consulting engineers who could not afford laboratories, research facilities would provide regular employment for some engineers. In many respects, the same motives also prompted Canadian scientists to take up industrial research.

Few opportunities existed in Canada for ambitious young scientists. Some were underemployed; many were forced to seek work in the United States.[40] This condition aroused the RCI's nationalist indignation. As the University of Toronto had earlier established a Ph.D. science programme to help stem the flow of Canadian students to American graduate schools,[41] the RCI hoped that the Bureau of Scientific and Industrial Research would help to curb the loss of Canadian scientists to American research laboratories. By combining the resources of industry and learning under a centralized bureaucracy of experts, the RCI not only planned to promote industrial efficiency, but also hoped to foster career opportunities for young scientists and engineers. "The Bureau", declared F.M. Turner, an industrial chemist and Secretary-Treasurer of the Bureau of Scientific and Industrial Research, "exists solely to try to get Canadian industrialists to avail themselves to a larger extent than they have in the past of the chemical and engineering talent we are developing in our universities ..."[42]

The CSCE also attempted to create work by restricting competition and securing for its members exclusive access to all public works engineering at both the provincial and, particularly, the dominion levels of government. This was justified, usually, on the pretext of protecting the public. Unlike non-professionals and special interest groups, engineers could rationalize their self-interest in terms of protecting the public interest.[43]

After the war, with the completion of major railway lines and the growing popularity of the automobile, road building became the most important public work in Canada. Although this was an excellent field for former railway engineers, in many instances construction was handled by non-professionals or local men of influence, especially in eastern rural areas. Engineers argued that roads should be built scientifically by experts in order to prevent waste.[44] W.A. McLean, Deputy Minister of Highways, Ontario, and EIC member, shared this view. Noting that "narrow motives" might be imputed for this suggestion, he asserted that employing engineers would be in the public interest, "a matter of public economy and efficiency".[45] Other important EIC members, such as A.W. Campbell, Dominion Highway Commissioner and George Hogarth, Chief Engineer, Department of Highways, Ontario, were also naturally disposed to this idea. Thus, while the CSCE promoted scientific road construction by qualified engineers as a public service and developed road specifications and standards, its more influential members were endeavouring to create work by eliminating competition from rival non-professionals.[46]

Earlier, the CSCE also tried to create work in the Dominion Government by restricting all aspects of government engineering to professionally qualified engineers — CSCE members. Between 1901 and 1918, the CSCE vigorously lobbied the government to raise the professional standards of its engineers. It proposed that they be brought under the provisions of the Civil Service Act to eliminate patronage through the merit system, then organized into a National Engineering Service, similar to the model Indian and Australian ones,[47] as a means of establishing high professional standards. Publically, it argued that this would eliminate waste and save taxes. Observing that several government departments had their own independent engineering sections, the CSCE also maintained that the appointment of an all-engineer Board of Engineering Control, to advise the government on public works policy, would improve efficiency by co-ordinating work and eliminating overlapping and duplication.[48] Privately, engineers understood that this body would, in effect, give them control of government engineering. While the government was sympathetic, Laurier's defeat, in 1911, and later the outbreak of war, blocked reforms. It was not until the end of the war that the Borden government, acting on a policy of civil service reform, made improvements.[49] At this point, the EIC focused its attention on the Public Service Commission and campaigned steadily for proper job classification and higher salaries.

In the meantime, the CSCE insisted that engineers should approve plans for public works[50] and be appointed to Boards of Health and Railway Commissions. These bodies, it contended, dealt with technical, as well as medical and legal problems.[51] It was necessary to protect the public from incompetent political appointees.[52] By 1917, the CSCE went so far as to question if it should press for amendments to existing legislation, in order to have engineers appointed to certain boards and commissions when, as one report stated, "it feels that these amendments are for the general welfare of the community".[53] To a certain extent, the EIC was partially successful. An amendment to the Ontario Highway Improvement Act, for example, recognized EIC professional standards by stipulating that engineers, appointed under its provisions, be EIC members. Four engineers were appointed to the Lake of the Woods Control Board and the war-time Fuel-Power Board consisted almost entirely of well known EIC members.[54] But, aside from these minor concessions,[55] the significance of the EIC's attempt to restrict competition lay in what it revealed about its ambitions.

Restricting all aspects of government engineering to EIC members would eliminate competition from nonprofessionals and unqualified political appointees and, to a lesser extent, doctors and lawyers who dominated boards of health and railway commissions.[56] Thus, EIC members would monopolize government engineering without licensing. In turn, this would not only create work and upgrade the engineer's standing, it would improve conditions generally by setting the standard for other employers.[57] Moreover, the centralization of engineers from various departments, under a National Engineering Service, and the establishment of a Board of Engineering Control, would have given engineers influence, perhaps even some political influence. Ultimately, however, these schemes revealed the engineer's longing for a more orderly, rational and bureaucratically structured environment, controlled by technicians. They longed to function autonomously and advance by recognized stages, without competition or political interference, to eventually assume more prestigious positions of social leadership.

IV

Protecting the public interest had other important advantages. It significantly raised the status of engineers and provided them with an elite social role.

The CSCE's enthusiasm for industrial research was partly an outgrowth of the war effort.[58] Taking to heart Lloyd George's 1915 remark that the war was a terrific contest between engineers of the warring nations,[59] they took up arms with patriotic zeal and soon earned distinction in rank and decoration.[60] The war gave them an unprecedented opportunity to demonstrate their usefulness, not only at the front providing fortifications and logistical support, but also at home producing munitions and maintaining essential services. It brought them to public attention. For the first time in the history of the profession, they received the recognition they thought they deserved.[61]

The prospect of peace, however, threatened to deprive them of the source of their prominence. The advocacy of industrial research, in many respects was a means of extending the war effort into peace-time by postulating the threat of an "industrial war", after the war. Engineers could then continue to play a socially useful role, since only they could apply science to industry and make science commercially viable.[62] As industrial research was the key to the emerging science-based chemical and electrical industries, engineers would be essential to national industrial progress and, ultimately, the national interest. Like Taylorites installing scientific management in American industry, engineers could attain independence, security and even power by performing an essential service.[63] Acting as independent professionals, without share capital or managerial prerogatives, they could circumvent the traditional management structures and emerge near the top, commanding authority and fees sufficient to preserve their middle-class status. By expanding the realm of their professionalism, as industry grew, they could even attempt to establish hegemony over industry.

Similarly, the CSCE's research on standardization[64] also offered engineers the same advantages. Before the First World War, most of the Society's research was devoted to preparing engineering specifications and standards. No other area of engineering had such a direct and crucial effect on practice and the economy. By 1914, the CSCE had already printed and distributed various construction specifications and, by 1918, the EIC was participating in national and international organizations to standardize industrial components.[65] Much of this work was taken over and institutionalized by the Canadian Engineering Standards Association (later the Canadian Standards Association — CSA).[66] Several prominent EIC members were CSA directors.

EIC members undoubtedly recognized that the demand for engineers in an industrial economy depended on their expert services which, in turn, rested on their exclusive possession of esoteric technical knowledge. It was essential for engineers to increase their knowledge through research, in order to enhance their usefulness to industry. Although EIC research on standardization was designed to improve engineering practice, it also gave engineers a competitive advantage in the marketplace over non-engineers, since only engineers could facilitate standardization.[67] Possessing a monopoly of technical knowledge and expertise essential to industry, standardization, like industrial research, helped to create an elite role for engineers in a rapidly expanding industrial economy, especially when engineering standardization became the key to large scale corporate consolidation.

But, as engineers contemplated their extraordinary potential in industry, their expectations were more realistic and pragmatic. The majority of CSCE members were civil, not industrial engineers. This fact precluded their participation in industrial research, except as publicists and promoters. Moreover, since the government was the only organization capable of conducting research, engineers probably saw themselves more in a bureaucratic context with executive responsibility. Significantly, the Memorandum on National Industrial Development recommended the appointment of an independent non-partisan board of consulting engineers, consisting of two representatives from each branch of engineering, presumably nominated by the CSCE. According to the Memorandum, it would act

> as consulting engineers to the Dominion Government responsible to the Prime Minister, independent of any department of the Government yet, available through the Prime Minister to all, in precisely the same way that the general manager of a corporation has consulting engineers at his call, not on his staff but available to take up independently of the working organization all such technical or economic problems as he may desire to have solved.[68]

Board members would act at the pleasure of the government. The choice of their replacement, however, would be at the discretion of the nominating engineering society.[69]

This plan was a bold, even presumptuous idea, which would have given non-elected technicians near ministerial authority without electoral sanction or bureaucratic restraint. Its real significance, however, was that it revealed the kind of elite social role that engineers wanted to play. This was more clearly demonstrated, on a practical level, by the CSCE's efforts to assist city governments. Engineers supported urban reform, town planning, volunteered advice on special engineering problems[70] and were of service in emergencies. During the Winnipeg General Strike, for example, they kept public utilities in operation and, later, performed a similar service in Montreal by operating the city waterworks with the help of 150 skilled tradesmen, drawn from local engineering firms.[71] But, of all its efforts to assist municipalities, the CSCE regarded two incidents as significant.[72]

In July, 1915, the Montreal members of the CSCE's Council, with the support of the Montreal Board of Trade, urged the city to appoint an independent board of engineers to investigate a proposed aqueduct hydro-electric power scheme.[73] They were concerned that no engineer of standing had studied the entire project and contended that it would be neither economical in construction, nor in maintenance. These misgivings were confirmed later by a comprehensive report published in the Canadian Engineer.[74] Caught up in a heated public ownership debate during an election year, city authorities at first adamantly refused, but later, after the engineers' repeated urgings, consented to the preparation of a gratuitous report.[75] Citing the economy of private ownership, an investigating committee, composed of seven of Montreal's most prominent engineers, acting independently of the CSCE as ratepayers, later recommended the immediate abandonment of the project in order to save money.[76] Unfortunately, this report did not significantly impress city politicians.

Engineers had more success in Calgary. In 1915, the Calgary City Engineers' Department was sharply criticized by an alderman (the former City Waterworks engineer who was dismissed after his department was merged with the Engineers' Department) for the construction of a large reinforced concrete arch bridge over the Bow River at

Centre Street. Fearing injury to the City Engineer's Department, as well as to the prestige of the profession, if the attacks continued, the Calgary Branch of the CSCE offered to make an impartial investigation. The city accepted. A three-man investigating committee, after a public hearing, concluded that there were no grounds for the charges. The city gratefully adopted the report. This ended the controversy and restored public confidence in the bridge and the City Engineer's Department.[77]

Although these incidents were unspectacular, they had special significance for engineers. They suggested an ideal role as independent consultants, possibly with some political influence. This would give them new prestige and authority from which they could aspire to social leadership.

Independent professional investigations revived the pre-war idea of expert commissions.[78] They had important advantages. Since engineers functioned as private citizens, the CSCE could avoid any appearance of being a special interest pressure group, a circumstance that would have compromised its members as impartial experts. Moreover, commissions gave engineers some immunity from political interference. Investigations were objective tribunals. Through rational and systematic analysis, engineers could publically expose what they regarded as the partisan and political nature of attacks upon engineer-officials. They served as a kind of deterrent. Commenting on the Centre Street bridge controversy, Sam G. Porter, Secretary-Treasurer of the Calgary Branch of the CSCE, maintained that members had performed a valuable public service by establishing the precedent that "charges reflecting upon the abilities of engineers in public office would have to pass the investigations of the local profession, that a great deal of unjust criticism would be avoided and the public relieved of a large amount of unnecessary worry."[79]

Commissions also gave engineers the opportunity to mould public opinion. They enabled them to alter the context and premises of public controversy by reducing it to its technical and economic elements, in order to appeal directly to the public, usually on the grounds of cost and efficiency. At the same time, while their biases were shrouded by a scientific mystique, investigations gave them a forum to expound their views. Predisposed to private ownership of municipal utilities (an outgrowth of their pro-business orientation),[80] they could, for example, transform the Montreal debate on public ownership from an alleged conspiracy of private power interests, forseen by one city controller,[81] to an indictment of municipal technical and financial mismanagement. Of greater importance, investigations enabled engineers to avoid the political process and play a dramatic part in public affairs. This enhanced their prestige and professionalism.

Referring to the Montreal and Calgary incidents, Professor McLeod advised members that similar actions, "judiciously taken", would not only discharge their civic responsibility, but also "eventually increase the prestige and public appreciation of the profession".[82] This would bring them to public attention. It would provide a base upon which to build their influence, in order to persuade the public how much society needed them. Trusting that the public would confer power and status in recognition of their importance, engineers could then assume more influential roles of social leadership.

V

Public service was a pragmatic response to the engineer's predicament — lack of status and jobs. But, engineers were not entirely motivated by self-interest. Public service was also ideologically consistent with their technocratic idealism. Only qualified experts, for example, should undertake industrial research. Prestige and employment, engineers assumed, were merely just rewards for their social contribution. Ultimately, however, the EIC's attempt to improve its status by identifying the engineer's expertise with the public interest, was only a qualified success. Public service undoubtedly increased the profession's prestige, but did not materially improve the condition of the mass of ordinary salaried engineers. Only the elite consultants benefitted directly from prestigious government appointments. As a learned society committed to limited social goals, the EIC could not solve the broader social and economic problems affecting the majority of its members. After the war, when confronted with more vexatious problems, these members would demand more pragmatic solutions.

NOTES

[1] Edit. "Publicity as an Asset", Journal of the Engineering Institute of Canada [hereafter cited: Jour EIC] 1 (Oct. 1918) p. 291.

[2] Unlike other professionals, engineers believed that they had little opportunity to practise speaking and writing. (Edit. "The Engineer and the Language", Canadian Engineer 25 [3 July, 1913] p. 118). "Being engineers," Professor Haultain remarked, "we are very poor hands at window dressing or publicity", University of Toronto Archives, Haultain Papers B 47 (B-72-005) [Hereafter cited: Haultain Papers] Box #1, Haultain "To Engineers", 15 April, 1918.

[3] H.E.T. Haultain, "Wielder of the Weapon", Transactions of the Canadian Society of Civil Engineers [hereafter cited: Trans CSCE], XXVIII (1914) p. 500.

[4] "Editorial Notes", Canadian Engineer 16 (12 March, 1909) p. 348; Cecil B. Smith, "The Relation of the Engineer to the Community", ibid., (23 April, 1909) p. 545; edit. "Engineers and Newspaper Reports", ibid. 19 (27 Oct. 1910) p. 547; "Presidential Address", (R.W. Leonard) Transactions of the Engineering Institute of Canada, XXXIV (Jan. 1920) p. 18.

[5] Haultain, "Wielder of the Weapon", p. 500.

[6] "Community Service by Professional Engineering Society", Canadian Engineer, 40 (26 May, 1921) p. 515.

[7] Ibid., G.G. Moon to Editor, Jour EIC II (March, 1919) p. 224; edit. "The Engineer and the Community", ibid. IV, (May, 1921) p. 313. Utilizing publicity to upgrade status was not a new idea. See eg. edit. "Engineers and the Press", Canadian Engineer 14 (18 Oct. 1907) p. 386.

[8] Edit. "Engineers Extending Influence", Jour EIC III (Dec. 1920) p. 580; "Saint John Branch", ibid.

(June, 1920) p. 318; "Report of Council for the Year 1920", ibid. IV (Feb. 1921) pp. 79-80.

[9] "Presidential Address" (R.W. Leonard), p. 18; "Tenth General Professional Meeting", Jour EIC IV (Sept. 1921) p. 508; "Victoria Branch", ibid. (Nov. 1921) p. 585. Engineers were also encouraged to get elected to public office. See eg. "Report of the Annual Meeting", Trans CSCE XXIII (1909) p. 18.

[10] C.D. Norton, "The Education of the Public", Canadian Engineer 28 (25 Feb. 1915) p. 289; "President's Address" (J. Galbraith), Trans CSCE XXIII (1909) pp. 111-112.

[11] R.O. Wynne-Roberts, "War and its Relation to Engineering Work", Contract Record 29 (3 Nov. 1915), pp. 1127-1128; Frank D. Adams, "The Work of the Advisory Council for Scientific and Industrial Research in Canada", Canadian Mining Institute Bulletin, (May, 1917) pp. 407-409. From the outbreak of war, Canadian manufacturers complained that they were unable to produce many articles essential to various trade processes, because of German monopolies. See eg. edit. "Development of Industrial Research", Industrial Canada XVIII (May, 1917) p. 54.

[12] Edit. "Industrial Research and its Relation to Commercial Supremacy", Contract Record 30 (22 Nov. 1916) p. 1101. Italics added. This concept of a "two fold war ... a war of arms and men" and a "'trade war'" was commonly held. See eg. edit. "The War and the Engineer", Applied Science IX (Oct. 1914) p. 3.

[13] Edit. "Industrial Research a Mighty Factor", Canadian Engineer 28 (13 May, 1915) p. 363; edit. "Industrial Reconstruction and Scientific Research", Contract Record 32 (26 June, 1918) p. 499; edit. "Industrial Research in its Relation to Commercial Supremacy", p. 1101.

[14] By 1918, there were only thirty-seven firms in Canada (less than two percent) that had research laboratories, compared with two thousand in the United States. Dr. A.B. Macallum, of the University of Toronto, estimated that there were not more than fifty pure research scientists in Canada. See, Mel Thistle, The Inner

Ring: The Early History of the National Research Council of Canada, (Toronto, 1966), p. 29; A.B. Macallum, "The Canadian Honorary Advisory Council for Scientific and Industrial Research", Canadian Mining Journal 40 (8 June, 1919) p. 28.

[15] Edit. "Research Work and the Manufacturer", Canadian Engineer 29 (7 Oct. 1915) p. 453; edit. "Canadian Research Bureau", ibid. 30 (13 Jan. 1916) p. 141; edit. "Need of Industrial Bureaus", Contract Record 31 (20 June, 1917) p. 531.

[16] Edit. "Industrial Research", Canadian Engineer 30 (29 June, 1916) p. 689; edit. "Industrial Reconstruction and Scientific Research", p. 499.

[17] Edit. "Competition After the War", Canadian Engineer 34 (6 June, 1918) p. 319. A. Mitchell Palmer, United States Alien Property custodian, seized and began selling all German owned patents to the highest bidder, until smaller companies successfully opposed the practice. See, David F. Nobel, America by Design: Science Technology and the Rise of Corporate Capitalism, (New York, 1977) p. 16.

[18] "Memorandum Regarding National Industrial Development in Canada to the Right Honourable Sir Robert Borden, GCMG Etc., Prime Minister of Canada, by R.A. Ross, C.H. McLeod, Walter J. Francis, H.R. Safford, Members of the Canadian Society of Engineers and Sir Charles Ross Bart, Member of the American Society of Mechanical Engineers, May, 1916", Trans CSCE XXXI (1917) pp. 341-348.

[19] Council Minutes, 20 March, 1917, p. 26.

[20] Various government control agencies, enacted under the Government's emergency powers between 1916 and 1918, tended to centralize Canada's war-time economy. By 1918, charitable and semi-official social services, like the Military Hospitals Commission, were placed under government authority. As in other countries, these activities helped to undermine *laissez faire* attitudes and prepared the way for the greatly expanded role of the government in Canadian economic and social life. J.A. Corry, "The Growth of Government Activities in Canada, 1914-1921", Canadian Historical Association, Report of

the Annual Meeting, (1940) pp. 66-73; Report of the Royal Commission on Dominion Provincial Relations, 1940, Bk 1, pp. 101-103. For a discussion of the impact of the government's emergency powers on the economy, see: David Edward Smith, "Emergency Government in Canada", Canadian Historical Review, L (Dec. 1969) pp. 432-435.

[21] Privy Council 1266, 6 June, 1916.

[22] Ibid. 2967, 29 Nov. 1916. The government, however, was not enthusiastic about the Honorary Advisory Council. Foster confided to his diary that most cabinet members were "utterly indifferent or antagonistic". Quoted in Thistle, The Inner Ring, p. 10.

[23] For the scope and activities of the Advisory Council, see: J. Castell Hopkins, Canadian Annual Review of Public Affairs, 1916 (Toronto, 1917) p. 445; "The Research Council", Canadian Mining Institute Bulletin No. 86 (June, 1919) pp. 580-581.

[24] Articles by British engineers were reprinted in the Canadian technical press (see eg. "Germany's Preparations for the Industrial Struggle After the War", Contract Record 29 (10 Nov. 1915) pp. 1153-1155 and "Engineering and Scientific Research", ibid. 30 (20 Sept. 1916) pp. 912-913). Many of their views resembled arguments advanced by Canadian Scientists (cf George Bryce, "The Crying Need of Industrial Research in Canada", Transactions of the Canadian Institute IX [1912] pp. 223-225; F.N. Turner, "The Value of Research to Industry", Canadian Mining Journal, XXXIII [15 Oct. 1915] pp. 617-621; J.C. Fields, "Science and Industry", The Board of Trade of the City of Toronto, Year Book [Toronto, 1917] pp. 45-47; Frank Arnoldi, Presidential Address at the Opening Meeting of 1915 [Toronto, 1915]). Engineers do not appear to have elaborated on any of these ideas, nor even to have assimilated the arguments in detail.

[25] Originally founded by Sandford Fleming and others as a professional society for engineers, architects and surveyors, the Royal Canadian Institute had traditionally served as a centre for the professionalization of Canadian science and engineering. For a historical profile of the Canadian Institute (as it was called until 1914), see W. Stewart Wallace, "A Sketch of the History of the Royal Canadian Institute,

1849-1949", in W. Stewart Wallace (ed.) The Royal Canadian Institute Centennial Volume, 1849-1949, (Toronto, 1949) pp. 121-167.

[26] The Royal Commission on Industrial Training and Technical Education summarized the chief features of this system as:

> (1) The University provides the laboratory accommodation and selects the Investigators ...
> (2) The Manufacturer, or the donor, indicates the specific subject or matter to be investigated and provides funds to support the fellowship for the purpose of such investigation.
> (3) Any discoveries become the property of the manufacturer ... subject to certain conditions, contained in the agreement between the donor and the University ...

Canada, Report of the Royal Commission on Industrial Training and Technical Education, Report of the Commissioners, (Ottawa, 1913-1914) Pt. II, p. 379.

[27] Royal Canadian Institute, Co-operation Between Science and Industry in Canada: the Royal Canadian Institute as an intermediary for its promotion; Establishment of a Bureau of Scientific and Industrial Research, (Toronto, 1914); Royal Canadian Institute, Bureau of Scientific and Industrial Research and School of Specific Industries of the Royal Canadian Institute, (Toronto, n.d.).

[28] For background on the NRC, see: Thistle, The Inner Ring and Wilfrid Eggleston, National Research in Canada: The NRC, 1916-1966, (Toronto, 1978). Although the Bureau of Scientific and Industrial Research did some minor research and disseminated useful technical information to various manufacturers, apart from an extraordinary offer from the Mellon Institute to administer five of its Fellowships at the Bureau, it could not obtain financial support after the appointment of the Honorary Advisory Council. See: J.C. Fields to Editor, Canadian Engineer 40 (23 June, 1921) p. 4.

[29] "Report of the Annual Meeting", Trans CSCE XXXI (1917) p. 109. The CSCE was particularly useful in helping the Advisory Council distribute an industrial questionnaire. "Committee Report of the Canadian Society of Civil Engineers", Contract Record 32, No. 4 (23 Jan. 1918) p. 62; Thistle, The Inner Ring, p. 29.

[30] EIC Scrap Book No. 6, Fraser S. Keith, "National Industrial Development" (18 April, 1916); University of Toronto Library, CSCE Toronto Branch Papers, MS 102 [hereafter cited: Toronto Branch Papers] Box #4, F.S. Keith to L.M. Arkley, 14 April, 1917.

[31] C.H. Mitchell, "The Future of Applied Science", Jour EIC III (Jan. 1920) p. 3; C.H. Mitchell to Editor, Canadian Engineer, 38 (13 May, 1920) p. 472.

[32] Andrew Charles Gross, "Engineering Manpower in Canada", (Unpublished Ph.D. Dissertation, Ohio State University, 1968) p. 50, Table 7B.

[33] In 1922, the Civil Engineering course, Faculty of Applied Science and Engineering, University of Toronto, ranked fourth in the number of students (130), behind electrical, chemical and mechanical engineering students (totalling 625). "Hamilton Branch", Jour EIC V (Jan. 1922) p. 34.

[34] Toronto Branch Papers, Box #7, Colonel A. McPhail to H.H. Vaughan, 2 Feb. 1919.

[35] Council Minutes, 14 June, 1898, p. 60; "Employment Bureau", Jour EIC I (May, 1919) p. 65. A Canadian employment bureau was badly needed. One Montreal engineer complained that he had to apply to Cleveland for a job located four blocks from where he lived. See, Frederick B. Goedick to Editor, Canadian Engineer 34 (23 May, 1918) p. 469.

[36] Edit. "Employment Service Bureau", Jour EIC III (June, 1920) p. 303; "An Opportunity for Service", ibid., IV (May, 1921) p. 312.

[37] See, H.H. Vaughan's remarks, "Discussion on Town Planning in Halifax", ibid. I (Sept. 1918) p. 269.

[38] Walter Van Nus, "The Plan-Makers and the City: Architects, Engineers and Surveyors and Urban Planning in Canada, 1890-1939" (Unpublished Ph.D. Dissertation, University of Toronto, 1975) pp. 88-90; "Ottawa Branch News", Jour EIC I (May, 1918) p. 62.

[39] Since 1894, the CSCE had urged the Dominion Government to establish laboratories to test Canadian building materials. This, it argued, would be in the public interest and benefit the Government — the largest consumer of structural materials. University engineering professors, many of whom did private consulting work, would also have benefitted if the Government had accepted the Society's recommendations to subsidize university engineering laboratories, pending the construction of a national testing laboratory. The Government was generally sympathetic to building testing laboratories, but the defeat of the Laurier Government, the change of conservative public works ministers and the outbreak of war, delayed implementation. Letter Book, McLeod to Sir John Thompson, 21 May, 1894, pp. 436-437; Toronto Branch Papers, Box #2, G.H. Keefer to William Pugsley, 29 Oct. 1910; "Report of the Annual Meeting", Trans CSCE XXIV (1910) p. 39; ibid. (1912) pp. 45-46; ibid. (1913) p. 41; ibid. (1914) p. 82; C.R. Young, "The Engineering Institute of Canada and Research", Engineering Journal, 30 (May, 1947) p. 216.

[40] Scientists like J.C. McLennan, Professor of Physics, University of Toronto, chided apathetic manufacturers for not recognizing how science could improve productivity and repeatedly warned that Canadian trained scientists, forced to work in the United States, were, in effect, strengthening competitive foreign industries at Canada's expense. They argued that Canada could only conserve its scientific talent by establishing attractive career opportunities in Canada. See, J.C. McLennan, "Industrial Research in Canada", Transactions of the Royal Canadian Institute, XI (1916) p. 154; J.C. McLennan, "Science in War and Peace", Addresses Delivered Before the Canadian Club of Ottawa, 1916-17, (Ottawa, 1918) p. 142; J.C. McLennan, "The Problem of Industrial Research in Canada", Industrial Canada, XVII (July, 1916) pp. 254-255; Royal Canadian Institute, "Report of the Board of Governors of the Bureau of Scientific and Industrial Research", Year Book and Annual Report, 1916-1917, (Toronto, 1917) p. 14; Turner, "The Value of Research to Industry", p. 151.

[41] Peter N. Ross, "The Establishment of the Ph.D. at Toronto: A Case of American Influence", History of Education Quarterly XII (Fall, 1972) pp. 358-380. Professor McLennan was one of the earliest recipients of this degree. H.H. Langton, Sir John Cunningham McLennan: A Memoir, (Toronto, 1939) p. 74.

[42] Public Archives of Ontario, Royal Canadian Institute Papers, No. II, F.N. Turner to C.L. Burton, 23 Aug. 1915.

[43] Edwin T. Layton Jr., *The Revolt of the Engineers: Social Responsibility and the American Engineering Profession*, (Cleveland, 1971) pp. 6-7.

[44] "Report of Annual Meeting", *Trans CSCE* XXV (1911) pp. 152-153; edit. "Good Roads and Engineering", *Jour EIC* II (3 March, 1919) p. 219; edit. "Message to Good Roads Congress", *ibid*., II (June, 1920) p. 303.

[45] *Ibid*., p. 304.

[46] "Report of the Annual Meeting", *Trans CSCE* XXV (1911) p. 152; "Report of Good Roads Committee", *ibid*., (1912) pp. 44-45; "Good Roads Congress", *Jour EIC* II (May, 1919) p. 407; edit. "Good Roads in Canada", *ibid*., III (April, 1920) p. 198.

[47] EIC Scrap Book No. 5, Memorial to Laurier, 18 Nov. 1910; "Report of Annual Meeting", *Trans CSCE* XXIV (1910) p. 88; edit. "Engineers in the Civil Service", *Canadian Engineer* 18 (4 Feb. 1910) pp. 95-96.

[48] EIC Scrap Book No. 6, Clipping n.d.; Toronto Branch Papers, Box #3, Clipping (edit. "National Engineering Service") n.d.; "Report of Annual Meeting", *Trans CSCE* (1910) pp. 82-83, 88; edit. "A National Engineering Service", *Canadian Engineer* 24 (23 Jan. 1913) p. 211. Similar arguments were advanced regarding government surveys. Without discounting the possibility of new employment opportunities, the CSCE urged that all government surveys (there were more than eight independent survey branches in the government) be coordinated and that a central registry bureau be established. "Memorandum to the Right Honourable Sir Wilfrid Laurier, Prime Minister of Canada", *Trans CSCE* XXI (1907) pp. 29-31; "President's Address" (William Anderson), *ibid*., XIX (1905) pp. 25-27.

[49] EIC Scrap Book No. 5, "Memorial to Laurier", 18 Nov. 1910; "Report of the Annual Meeting", (1910)

pp. 83-85, 88-89; Council Minutes, 11 Feb. 1911, p. 27; C.E.W. Dodwell to Editor, *Canadian Engineer* 34 (25 April, 1918) pp. 361-362; "Ottawa Branch News", *Jour EIC* 1 (May, 1918) pp. 61-62; Council Minutes, 24 Sept. 1918, p. 86; edit. "Salaries of Engineers", *Jour EIC* 11 (Jan. 1919) p. 18.

[50] "Report of Annual Meeting", *Trans CSCE* XXI (1907) p. 41; *ibid*. (1908) p. 8; *ibid*. (1911) p. 137; Toronto Branch Papers, Box #5, "Circular Resolutions", 22 April, 1918; "Report of Council Meeting", *Jour EIC* 11 (Oct. 1919) p. 689.

[51] Council Minutes, 8 March, 1904, p. 310; *ibid*., 10 March, 1908, pp. 205-206; edit. "The Medical Officer of Health and the Engineer", *Canadian Engineer* 23 (19 Sept. 1912) p. 484; edit. "Public Health Act of Ontario", *ibid*. (16 Jan. 1913) p. 180; edit. "Engineering Help is Needed", *ibid*. 33 (23 Aug. 1917) p. 169; Toronto Branch Papers, Box #4, "Report of the Committee on Sewage Disposal", 18 Dec. 1918; "Memorial to Borden", *Jour EIC* 11 (4 April, 1919) pp. 337-338; Council Minutes, 21 Dec. 1920, p. 103; *ibid*. 22 June, 1920, p. 65.

[52] Edit. "Maintaining a High Standard", *Jour EIC* III (July, 1920) p. 357. If high standards were not maintained, S.G. Porter, Secretary-Treasurer of the Calgary Branch, argued that "the interest of the public and the prestige of the profession ... [would] suffer". "Alberta Engineers Discuss Engineer's Status and Proposed Legislation", *Canadian Engineer* 34 (24 May, 1918) p. 463.

[53] "Report of the Sewage Disposal and Sanitation Committee", *Trans CSCE* XXXI (1917) p. 105.

[54] Edit. "Improving the Highway Improvement Act", *Jour EIC* III (June,1920) pp. 302-303; 'Ottawa Branch", *ibid*., (June, 1921) p. 373; edit. "Practical Recognition for Engineers", *ibid*. (March, 1919) p. 221; edit. "Government Commission Composed Entirely of Engineers", *ibid*. 1 (Nov. 1918) p. 336; "Fuel-Power Board Created", *ibid*. (June, 1918) p. 92.

[55] Engineers were still forced to compete with political appointees and other professionals — chiefly lawyers — and were sometimes excluded from important

positions which required technical knowledge. Many EIC members, for example, were outraged that municipal engineers were not appointed to the Halifax Commission which superintended reconstruction of the city, after the 1917 explosion. Haultain Papers, Box #1, Letter to Haultain, 3 May, 1918; Toronto Branch Papers, Box #5, S.G. Porter to Keith, 19 March, 1918; Keith to Porter, 22 March, 1918; Porter to Keith, 3 April, 1918.

[56] "Report of the Annual Meeting", Trans CSCE XXV (1911) p. 143; Council Minutes, 15 May, 1917, p. 46; Toronto Branch Papers, Box #4, S.G. Porter to C.H. McLeod, 4 Jan. 1917; edit. "Engineers on Railway Commission", Jour EIC IV (Jan. 1921) p. 34.

[57] "Report of Annual Meeting", Trans CSCE XXIV (1910) p. 101; ibid. (1913) pp. 86-87; edit. "Federal Status of Engineers", Jour EIC II (Aug. 1919) p. 560.

[58] For background on the engineers' war service, see: "The Engineer in Peace and War — The Increasing Value of Trained Men" (Walter J. Francis) Contract Record 30 (5 April, 1916) pp. 324-325; "The Work of the Canadian Engineers in France", ibid. 31 (21 March, 1917) pp. 261-262; "Ottawa Branch", Jour EIC III (Jan. 1920) p. 22; Arthur W. Currie, "Engineering Battalions: Their Work in the War", Canadian Engineer 38 (12 Feb. 1920) pp. 201-210.

[59] Walter J. Francis, "The Engineer and the War", ibid. 30 (6 April, 1916) p. 417.

[60] The EIC was extremely proud of the fact that a third of its members (960 men, 943 of whom were officers before the end of the war) were on active service. These men earned 116 decorations, including two Victoria Crosses. Remarkably, they suffered only seventy-five dead. "Victory", Canadian Engineer 35 (14 Nov. 1918) p. 237; H.H. Vaughan, "The Manufacture of Munitions in Canada", Transactions of the Engineering Institute of Canada XXXIII (1919) p. 1; "Honour Roll", Toronto Branch of the Engineering Institute of Canada, Yearbook (1919) p. 10; Council Minutes, 25 Feb. 1919, p. 24; "Report of Honour Roll Committee", Jour EIC II (March, 1919) p. 162; "Personals", ibid., p. 237.

[61] Edit. "The Engineer and Public Service", Canadian Engineer 31 (9 Nov. 1916) p. 389; edit. "Recognition

of the Engineer", ibid. 33 (22 Nov. 1917) p. 447; "Tenth General Professional Meeting", Jour EIC IV (Sept. 1921) p. 506.

[62] Edit. "Strategy of Research", Canadian Engineer 29 (18 Nov. 1915) p. 600. Engineers rarely acknowledged the paradox that engineering was, in turn, dependent on science. For an exception, see: edit. "Canadian Research Bureau", ibid. 30 (13 Jan. 1916) p. 141.

[63] It has been suggested that scientific management gave engineers autonomy and helped to preserve their middle-class status. (See, Samuel Haber, Efficiency and Uplift: Scientific Management in the Progressive Era, 1890-1920, [Chicago, 1964] p. XII; Monte A. Calvert, The Mechanical Engineer in America, 1830-1910: Professional Cultures in Conflict, [Baltimore, 1967] p. 243, and esp. Layton, Revolt of the Engineers, p. 139). Although Canadian engineers were familiar with scientific management (in 1913, Taylor addressed the University of Toronto Engineering Society), apart from condemning labour's opposition to the system and contributing, an occasional article to the technical press on its practical application, they did not appear to be interested in Taylorism, at least before 1922; edit. "Scientific Management", Canadian Engineer 21 (28 Sept. 1911) p. 372; "The Principles of Scientific Management", ibid. 24 (13 Feb. 1913) pp. 295-296; J.S. Cameron, "Industrial Relations", Jour EIC III (May, 1920) pp. 243-250.

[64] According to one report, the primary object of engineering standardization was to

> secure interchangeability of parts, to cheapen manufacture by the elimination of waste entailed in producing a multiplicity of designs for one and the same purpose, to effect improvement in workmanship and design and, by concentration rather than by diffusion of effort, to expedite delivery and reduce maintenance charges and storage.

("Engineering Standards Committee", ibid. [July, 1918], p. 168). On the importance of engineering standardization to a modern industrial economy, see Noble, America by Design, chap. 5.

[65] "Report of Annual Meeting", Trans CSCE XXVIII (1914) p. 14; "Canadian Engineering Standards Committee",

p. 168; "Report of Engineering Standards Committee", ibid. III (Feb. 1920) p. 53.

[66] For the history, organization and work of the Canadian Engineering Standards Association, see: Canadian Engineering Standards Association, *Yearbook* (Ottawa, 1927) pp. 5-10.

[67] Some engineers, such as W.J. Francis, for example, even objected that some specifications were "Too educative in character" and could be used by mechanics and others to compete with engineers. W.J. Francis, quoted in "Canadian Society of Civil Engineers Holds Momentous Annual Meeting", *Contract Record* 32 (30 Jan. 1918) p. 77.

[68] "Memorandum on National Industrial Development", p. 347.

[69] *Ibid*.

[70] For example: "Report of Annual Meeting", *Trans CSCE* XXVI (1912) pp. 88-89; *Regina Morning Leader*, quoted in *Jour EIC* 1 (May, 1918) p. 66; "Ottawa Branch", *ibid*. IV (Feb. 1921) p. 78. Professor McLeod advised members that, while it might be detrimental to the profession to give free advice, cases could arise, as he put it, "through the ignorance or apathy of officials, in which public interest and the prestige of the engineering profession may suffer grievously if gratuitous advice is not forthcoming ..." Toronto Branch Papers, Box #4, C.H. McLeod, "Memorandum for the consideration of the Branches of the Society", 13 Jan. 1917.

[71] "Vancouver Branch", *Jour EIC* II (July, 1919) p. 520; edit. "Winnipeg Engineers' Achievement", *ibid*. (Aug. 1919) p. 562; edit. "Service to the Public", *Canadian Engineer* 38 (12 Feb. 1920) p. 217.

[72] McLeod, "Memorandum for the consideration of the Members", "President's Address" (G.H. Duggan), *Trans CSCE* XXXI (1917) p. 74; "Report of Annual Meeting", *ibid*. (1917) pp. 18-19.

[73] Council Minutes, (McLeod to the Mayor of Montreal), 17 Aug. 1915, p. 355; *ibid*., 5 Oct. 1915, p. 339;

ibid., 16 Nov. 1915, p. 350; "The Canadian Society and the Montreal Commissioners", Contract Record 29 (27 Oct. 1915) p. 1098. Montreal engineers had a special affection for the city waterworks. It was built by T.C. Keefer and expanded by many prominent Montreal engineers. For background, see: John Irwin Cooper, Montreal: a Brief History, (Montreal, 1969) pp. 27, 109-110; "Engineers Condemn Montreal Aqueduct Scheme", Canadian Engineer 31 (23 Nov. 1916) pp. 424A-424B.

[74] "Montreal Waterworks Situation", Canadian Engineer 29 (11 Nov. 1915) pp. 569-572. This was an extraordinary move for this journal. It rationalized its actions by arguing that there was "insufficient data upon which to base a proper judgment", ibid., p. 572.

[75] "Report of Annual Meeting", Trans CSCE XXX (1916) p. 15; "Montreal Rejects Advice of C.S.C.E.", Contract Record 30 (12 Jan. 1916) p. 30; McLeod, "Memorandum for the Consideration of the Branches of the Society". Engineers deeply resented politicians making important technical decisions. "It is unfortunate", lamented the Contract Record, "that a man [Controller Thomas Coté] without technical training should be at the head of the civic public works department and should thus be in a position to decide matters involving engineering questions and millions of dollars." (edit. "The Montreal Aqueduct", Contract Record 29 [10 Nov. 1915] p. 1149). They particularly resented Controller Coté's statements that competent engineers had approved the project. The CSCE acknowledged that some engineers had examined parts of the project, but held that no prominent engineer had studied the entire project. Ibid., edit. "Montreal Rejects Advice of C.S.C.E.", p. 30.

[76] "Engineers Condemn Montreal Aqueduct Scheme", pp. 424A-424B. The main points of the Report are summarized in Hopkins, Canadian Annual Review 1916, pp. 588-589.

[77] The most detailed account of this incident was published in a letter to an American engineering journal. See: Sam G. Porter to Editor, Engineering News 75 (15 June, 1916) pp. 1148-1149.

[78] See Chap. III, p. 96.

[79] Porter to Editor, p. 1149.

[80] Although in principal, engineers were opposed to any political involvement in commercial undertakings, because of the potential for corruption and inefficiency, they rarely argued in political terms, preferring to assess the issues on their technical and economic merits. They would accept some limited forms of government regulation, but insisted on private ownership. (See eg.: W. McLea Walbank, "Municipal Ownership of Public Utilities vs Private Enterprise", Trans CSCE XXII [1908] p. 55, and W.F. Tye, "Canada's Railway Problem and its Solution", ibid. XXXI [1917] pp. 146-187). At the same time, however, many prominent engineers had close links with private corporations. W. McLea Walbank, was the managing director of the Montreal Light Heat and Power Company and W.F. Tye was the Chief Engineer for the CPR. Both men were past presidents of the CSCE. Other engineers, such as Arthur Surveyer, had done extensive private consulting work for private power companies (J.W. Leonard, Who's Who in Engineering [New York, 1921] p. 1228) and, in 1917, five CSCE members, including some who had served on the Montreal Aqueduct Power investigation, submitted a report commissioned by several Hamilton ratepayers, which opposed the construction of a provincially owned Hydro Radial Railway, on the grounds of cost and recommended road construction instead. Council Minutes, 20 March, 1917, p. 29; "Ontario's Hydro Radial Railway", Canadian Municipal Journal XII (Feb. 1916) p. 60; H.V. Nelles, The Politics of Development: Forests, Mines and Hydro Electric Power in Ontario, 1849-1941, (Toronto, 1974), p. 409.

[81] "Montreal Rejects Advice of C.S.C.E.", p. 30.

[82] McLeod, "Memorandum for the Consideration of the Branches of the Society".

Chapter VIII

CONTEMPLATING THE "UNTHINKABLE"
THE EIC AND UNIONISM

In the years immediately following the war, engineers became alarmed about the problem of inadequate salaries. Inflation had seriously eroded their income and threatened their status. Unable to obtain assistance from the EIC, as individuals, they were forced to consider collective action.

I

"At best", complained one engineer, "engineering is a poorly paid occupation ..."[1] This view was widely held. Opinions varied about why engineers were underpaid,[2] but all agreed on one point: inflation had significantly reduced their income.[3] Between 1913 and 1920, the cost of living had risen 92 percent.[4] This substantially reduced purchasing power and forced some engineers to draw on savings.[5] While organized labour received large wage increases, engineers protested that their salaries had not improved. They claimed that they were paid little more, perhaps less, than tradesmen.[6] "The average wage of the Canadian Engineer", observed a government engineer "is hardly more than the wage paid the most ordinary and uneducated class of mechanics or make-believe tradesmen in practically all parts of the country."[7] Government employment advertisements reinforced this belief. In a notorious 1918 Canada Gazette advertisement, cited by many as representative, a technical clerk with an applied science, mathematics, or physics degree, was offered an annual salary of $1,300.00. In the same issue, draughtsmen were offered $1,500.00, a law clerk $2,100.00 and a moving picture cameraman $2,400.00.[8]

For over half a century, engineers had struggled to rise above the status of tradesmen. Earning little more than mechanics and clerks had symbolic significance; it called into question their social progress. For Fraser S. Keith, low salaries were an insult, "an affront to the profession".[9] Most engineers believed that they were entitled to higher salaries because of their qualifications and responsibility.

II

Although many engineers thought they earned less than tradesmen, in reality they earned substantially more. Between 1911 and 1921, for example, while electricians and plumbers increased their earnings 70.3 percent and 55.4 percent respectively,[10] they still earned less than engineers. At $40.33 in 1921, engineers averaged $13.47 a week more than electricians and $14.15 more than plumbers.[11] They were also well ahead of federal and provincial government clerks, who averaged only $27.63 in the same year.[12] Moreover, compared with other professionals in 1921, engineers were well paid. Although civil engineers earned about $500.00 a year less than the highest paid professionals, professors and lecturers,[13] they averaged more than architects, doctors and dentists.[14]

It is possible that engineers, like some other wage and salary earners, may not have appreciated their real earnings and imagined that inflation was lowering their standard of living.[15] As private citizens, they may also have believed that profiteers were manipulating prices; but, as professionals, their reaction was quite different. They did not succumb to hysteria, nor were they led astray by misinformed agitators. They were highly educated and approached most problems rationally. They had accurate first hand knowledge of the industrial labour market. While they angrily protested low salaries, sometimes with unbecoming rhetoric, their grievances were real, not imaginary.

The apparent discrepancies in their salaries arose from disparities in income distribution. Although the 'average' civil engineer's salary was relatively high,[16] most earned considerably less. As in other professions, older practitioners earned more than younger colleagues. Engineers generally did not begin to receive higher salaries until they were at least forty years of age.[17] Their salaries jumped as much as 85 percent between the 20 to 24 and 45 to 49 year age groups.[18] Although not all engineers over forty earned high salaries,[19] statistically, their combined incomes weighted and thus distorted the 'average' engineer's salary. A more accurate picture emerges from the pattern of income distribution among engineers under forty.

For the first years after graduation, civil engineers usually worked at a variety of "sub-professional"[20] jobs — roadmen, chainmen, instrumentmen, draughtsmen — that required only high school education, before advancing to professional positions.[21] The sub-professional engineers furnished a plentiful supply of cheap skilled labour for large corporations[22] and competition for professional positions was fierce. In spite of their high educational qualifications, they were paid only slightly more than clerks and tradesmen.[23] But, while they suffered hardship, even exploitation, they rarely complained. For the most part, they earned a 'living wage' and had few financial commitments. Young and ambitious, they were willing to tolerate low salaries and compete for more lucrative junior professional appointments.

Engineers in these junior professional positions, however, had their own problems. Between twenty-five and thirty-nine years of age, most junior professional engineers held low ranking civil engineering positions. They did not have enough professional experience (nor, often, the higher membership fee) to qualify as full members of the EIC.[24] Having fought their way out of the sub-professional ranks, they had not fully established themselves in secure corporate positions. While they earned more than tradesmen,[25] they were paid less than some skilled railway workers. Locomotive drivers, for instance, averaged 17 percent more than engineers under thirty-five and even conductors received marginally higher salaries.[26] This was a constant irritation because many junior professional engineers worked for railways. Nevertheless, although they earned less than these workers, they could just afford some of the essentials of middle-class status. But, in spite of the fact that they earned more, and possessed more than most tradesmen and younger sub-professional engineers, they felt impoverished.

Most sub-professionals were under twenty-five and single. Earning skilled tradesmen's wages, they could easily support themselves, when employed.[27] Junior engineers, however, were older and usually had families to support, in addition to incidental professional expenses. As well, they felt compelled, as one report noted, "to maintain a standard of living commensurate with the general standards of the community, or positions of similar dignity and respectability ..."[28] They could not live like tradesmen. Maintaining a 'respectable' standard of living was as much a condition of employment as a professional requirement, an expensive obligation not expected of sub-professionals.[29]

While junior professional engineers could withstand foreign competition, lack of public recognition and control over their professional lives, even the humiliation of earning less than locomotive drivers and conductors, they could not tolerate the steady erosion of their standard of living. As prices continued to rise, they became increasingly anxious and complained bitterly of being unable to preserve their "professional dignity".[30] Although not reduced to poverty, they feared something worse: a fall from middle-class grace. They began to lose confidence in the old doctrine that individual initiative and professional excellence would be rewarded with status and security. They no longer felt responsible for their social progress and blamed others for their predicament.

Unlike some radical labour leaders, however, they did not fault the economy for their misfortune. Believing that capitalism was basically sound, they never developed a radical critique, nor saw their condition as part of a larger process. While they did not consider their problem unique, their analysis did not extend beyond the bounds of the profession; indeed, they viewed it as a "family affair".[31] As salaried employees of large corporations, their employers were usually other engineers. They held these men directly responsible[32] for their low salaries. "Is not this state of affairs", questioned J.C. Legrand, "greatly due to the senior members of the profession who, when at the head of a department, forget too easily the hardships through which they also passed?"[33] Accustomed to accepting authority, the junior engineers assumed that their dispute could be settled like a family matter through the sympathetic intervention of senior engineers. They were soon disappointed.

Management engineers were primarily loyal to business.[34] The profit motive and career ambition usually took precedence over science and colleagual responsibility.[35] Their jobs depended on keeping costs down. As department heads, or middle-level technical administrators, they did not have the authority to grant the kind of pay increases younger engineers expected. The same principles applied, in a different way, to government engineering departments. Moreover, because their employers controlled the EIC, the young professionals received little help from their own professional society.

Selecting its officers from among the prosperous and powerful,[36] the "capitalistic class of the profession",[37] as one engineer put it, the EIC initially opposed agitating for higher salaries on the grounds that such action was undignified and inappropriate for a learned society. Thus, unable to obtain justice from their employers, or help from their professional society, junior engineers were forced to consider other alternatives.

III

By 1918, the engineering press began to notice discontent among younger engineers. This unrest was widespread throughout North America.[38] In Canada, dissatisfied engineers abandoned the EIC in despair. They organized new engineering societies and even considered organizing trade unions to protect themselves.

In February, 1919, for example, at a time when interest in the Vancouver Branch of the EIC had waned, the British Columbia Technical Association (BCTA) was founded.[39] Its membership included engineers, as well as other related professional and non-professional technical workers. Unlike a learned society, the BCTA's purpose, in the words of its Secretary-Treasurer, was the "protection and advancement of the material welfare of its members ..."[40] Its activities included protesting the employment of aliens on provincial and municipal public works, preparation of a schedule of minimum salaries for civil engineers and, most importantly, obtaining restrictive provincial licensing laws for engineers and architects.[41] By 30 April, 1920, with branches in Vancouver, Victoria and Cumberland, the BCTA had 479 members.[42] This included practically all members of the EIC's Vancouver Branch.[43]

The attempt to organize a chapter of the American Association of Engineers (AAE), in Toronto, was a more dramatic development. Originating in 1915, in Chicago, the AAE was a short lived protest organization dedicated to advancing its members' economic interests. Its members were predominantly young civil engineers. Under the able leadership of Frederick H. Newell, a University of Illinois civil engineering professor and an important national leader of the American conservation movement, the AAE grew spectacularly from a few dozen members in 1915 into the world's largest engineering society by 1921, before its rapid decline into relative obscurity by 1925.[44]

Even before the AAE had attained prominence, some Canadian engineers became excited about the prospect of organizing a similar association in Canada. In the spring and summer of 1918, two young EIC members, H.A. Goldman, assistant engineer, Toronto Harbour Commission, and F.B. Goedick, assistant engineer, Hydro-Electric

Power Commission, Ontario, took the preliminary steps. Rather than establish an AAE chapter, however, they created an independent Canadian organization — the Canadian Association of Engineers (CAE).[45] Professing aims similar to the AAE, it attracted mostly younger engineers and while it claimed to be complementary to, not a competitor of the EIC,[46] the EIC considered it a serious threat and later resolved to destroy it.

Undoubtedly, the most important sign of discontent was the emergence of a trade union sentiment. Some prominent engineers such as Professor H.E.T. Haultain, as well as several junior engineers, asserted that unionization was the only solution to the engineer's economic problems.[47] The technical press discussed this idea and, in March, 1920, the Toronto Branch of the EIC even sponsored a lively debate on the subject.[48] Rejecting the notion of an orderly market governed by the natural laws of supply and demand, unionization advocates used classic trade union arguments and rooted their case in the belief that the engineer was essentially a working man.[49] His place was with labour, not capital. "Our natural interest as engineers", declared Montreal engineer, C.A. Mullen, "is with those who 'work' in industry, not with those who 'own' industry ..."[50] Continuing, he declared that

> The sooner we engineers ... come down from our self-erected mental pedestals and recognize the

> fact that we are but labourers in a common vineyard, along with the rest of struggling, sweating humanity, the better it will be for both of us as a group of professionals and for the community at large ...[51]

Contending that trade unions had benefitted working men significantly, Mullen and others urged engineers to organize. Professional societies, they argued, could neither protect engineers, nor raise their salaries. Unorganized, they were at the mercy of unsympathetic employers.[52]

On the surface, conditions appeared right for unions to flourish. Junior engineers seemed to constitute an alienated, class-conscious group of dissatisfied employees. Some prominent engineers had made unions more respectable and potential leaders advanced persuasive arguments. However, while support for a union was growing, it had not developed into a positive movement. Unions were being discussed, not organized. There was no sense of urgency, no spontaneity, nor grassroots support, nor even experienced organizers with a practical plan of action. At this point, only a minority of engineers supported the idea. Except for the "Draughtsmen's Union"[53], no professional engineers' union was organized.

A number of factors inhibited union development. Engineers were difficult to organize. They were scattered throughout a multitude of remote industries across Canada and moved nomadically from job to job on short term contracts. They lacked a common industrial base on which to organize a union. In spite of an outward appearance of occupational similarity, engineers were not alike. They worked in different industries, performed different technical and administrative functions and occupied different positions in corporate hierarchies. Unable to organize across industrial lines, they could neither bargain collectively, nor threaten a strike. Strikes could always be broken by unorganized engineers who had no ethical reservations about sharp competition for scarce jobs in an overcrowded profession, especially during periods of unemployment.[54]

Other factors, such as the engineer's background and attitude, also curbed the growth of unionization. By the end of the nineteenth century, the era of the upper-class engineer, like T.C. Keefer who used engineering to help preserve class privilege,[55] was over. Most Canadian engineers, like their American counterparts, came from humbler origins. In 1924, as part of a larger study on engineering education, the Society for the Promotion of Engineering Education discovered that most American engineers came from lower-middle class, small town, old stock families.[56] C.D. Howe, for example, a ninth generation New Englander, came from a comfortable, but not a wealthy family. His father was a carpenter, turned house builder[57] — a background typical of most Canadian engineers. Few had private school backgrounds like

Keefer; but fewer still had working-class, union backgrounds. Like Howe, many were raised on Horatio Alger.[58] They were staunchly individualistic and thoroughly imbued with the spirit of enterprise. Fiercely competitive, their constant concern was to improve their individual status.[59] Unions, they thought, thwarted this ambition and induced a "levelling process"[60] which lowered their status. "By unionizing," Professor Peter Gillespie warned, "engineers would prostitute an ancient honourable and respected calling to the level of a trade ..."[61] Engineers had struggled to rise above workmen. They had a strong middle-class bias against workmen and regarded unions as corrupt, irresponsible and radicalized. Their main principle, according to Fraser S. Keith, was to "demand and threaten without assuming any responsibility, either collectively or individually ..."[62] The industrial strife of 1919 culminating in the Winnipeg General Strike, reinforced this prejudice. According to Keith, it was "unthinkable"[63] that engineers should even consider union methods.

While unionization may have been in the engineer's immediate interest, they could not see themselves as class-conscious unionists, implacably arrayed against capital. This was alien to their thinking and contrary to their philosophy. Their social awareness had increased during the war, but their basic philosophy, especially their attitude to labour relations, had not changed. As late as 1919, in spite of their financial distress, the older conservatives continued to set the pattern of belief for the rest of the profession. Most engineers still assumed that, in a progressive liberal society, they could achieve success individually by serving, rather than opposing business. Above all, they believed that they were unique, that they occupied a novel position intermediate between capital and labour (because they were salaried men, not capitalists or wage earners)[64] and had a special mission to end class conflict. Although the ideal of the independent professional was sharply at variance with their status as salaried employees, engineers refused to abandon their aspirations for social leadership by embracing alien collectivist principles.

In turning away sharply from labour, however, engineers invariably moved closer to business. In spite of their reservations about its unproductivity, they eventually became more closely allied, partly because of a pragmatic, perhaps cynical realization that engineering depended on business and partly because of the conviction that business, in contrast to labour, was at least closer to the world's enlightened, progressive forces. Rather than fight for justice collectively with labour, they preferred to await better times and compete for success as individuals with business. They were content, as C.A. Mullen lamented, to be the "Little Brother of the Rich", rather than the "Big Brother of the Poor".[65]

IV

While it was unlikely that engineers would organize a union, the spectre of unionism terrified conservative EIC councillors. Caught up in the national hysteria arising from the Bolshevik revolution and the 1919 domestic labour unrest, they saw unions as a major threat. They were convinced that unionization would destroy their carefully nurtured professionalism and ruin the EIC's prestige and credibility as a learned society. They did not fear junior engineers; what really frightened them was the growing support for unions among prominent and respected engineers.[66] It was imperative, they believed, that unions be firmly opposed. Although the AAE and the CAE had taken a strong anti-union stand,[67] the EIC seemed to regard the CAE as the spearhead of American engineering trade unionism in Canada.[68] They were less concerned about the BCTA, in spite of its aspirations to expand into other provinces and form a Canadian Technical Association.[69] Their immediate objective, therefore, was to crush the CAE.

The CAE was attacked on two fronts. To undermine it from within, Fraser S. Keith recruited prominent Toronto engineers to persuade CAE supporters to return to the EIC, on the grounds that their organization needlessly duplicated the EIC.[70] In spite of H.A. Goldman's skepticism about the EIC's pledges to assist younger engineers,[71] the CAE found it increasingly difficult to resist the EIC's overtures. At a May, 1918, meeting, for example, a Canadian Engineer reporter argued that the objectives of the two organizations were identical and urged that the EIC be given a chance to prove its good intentions. After a thorough discussion, F.B. Goedick, acting as chairman of the CAE during Goldman's illness, moved a resolution to suspend further meetings, except for the constitutional committee. This carried unanimously.[72] A year later, the CAE was attacked indirectly, in Chicago, at the AAE's annual meeting. Assuming that the AAE was behind the CAE, Keith addressed the convention, stressing the EIC's similarity to the AAE. The meeting responded by passing a resolution prohibiting the establishment of AAE chapters in Canada.[73] While this provision was rescinded the following year at the AAE's St. Louis Convention,[74] the AAE and its imitators were finished in Canada. By this time, EIC branches had closed ranks and persuaded their members not to support the AAE.[75]

The CAE's destruction was a minor victory for the EIC. The CAE was in its infancy, had few supporters and perhaps little chance of success. It was not a trade union. The ferocity with which the EIC destroyed it demonstrated not only the Institute's anti-union fervour, but also its resolve to defend its prerogatives from outside encroachment, particularly from the United States. This was also evident in the EIC's attempt to contain the expansion of major American engineering societies, in Canada, through gentlemen's agreements secured in New York.[76]

As the imminent danger of unionism faded with the CAE's demise, the conservatives faced another, perhaps more insidious threat — collective bargaining. Although engineers would not organize a union, they had not rejected other forms of collective action to increase salaries.

Following the war, the main initiative to improve salaries came from EIC branches, not Council. On 5 March, 1919, for example, the Toronto Branch appointed a committee to study salaries, in order to stimulate discussion and prod the Council into similar action. Committee members included prominent Toronto engineers, as well as H.A. Goldman (Secretary) and F.B. Goedick. On 16 October, 1919, after careful study, it submitted its report. This remarkable study was the first of its kind in Canada. It was patterned after similar ones prepared by the ASCE and AAE and classified engineers employed by various industries into job categories, together with minimum qualifications and salaries. Following branch approval, it was forwarded to other branches, before its submission to Council with a recommendation that the EIC officially adopt it.[77]

Ostensibly, salary schedules were merely guides to current professional salary levels.[78] But, while the conservatives could accept them as innocuous administrative aids, they feared the salary schedules might be used to coerce, rather than assist employers. Developments in the United States and Canada made the conservatives suspect that the schedules were, in fact, the leading edge of collective bargaining. Salary schedules were a major priority for the AAE[79] and the Toronto Branch had brazenly recommended to local employers that its schedule be implemented.[80] A more alarming development was evident later in Manitoba. While Manitoba Branch members pledged not to accept positions at a salary less than an agreed rate, the Branch planned to negotiate with large corporate employers to have its salary schedule adopted. Members, failing to receive an adequate salary, would be helped to find other employment at an acceptable salary.[81] Although this was not collective bargaining, partly because of the absence of the strike threat, it could produce nearly the same effect.

This placed EIC conservatives in an awkward dilemma. If they ignored, or even encouraged the development of salary schedules, they chanced precipitating collective bargaining; if they opposed them, they risked alienating the membership and undermining their own authority. For, not only was there widespread support for salary schedules, but dissidents, such as H.A. Goldman, were not mollified by EIC promises to help improve salaries.[82] They demanded action. The conservatives, however, realized that helping members increase their salaries would have been an abrupt departure from EIC policy. In spite of its 1917 decision to help serve the public, the EIC was still primarily dedicated to facilitating the interchange of professional knowledge among its members. Serving the economic interests of individuals was contrary to its traditional educational role. Nevertheless, while undoubtedly moved by the financial distress of younger members, the conservatives also realized that unionization would be forced on the profession if they did not act.[83] Although they had crushed the CAE, they had not eliminated the threat of unionism. The underlying discontent remained and grew. To eradicate it, they decided to remove the source of unrest by helping younger engineers improve their financial position.

To a certain extent, this was already EIC practice prior to 1920. For example, it had helped government engineers to increase their salaries. While most engineers were employed by private corporations, the

Institute believed that raising Dominion Government engineers' salaries would indirectly help all engineers, because it would set the standard for other public and private employers.[84]

Following the passage of the 1918 Civil Service Act, the Civil Service Commission (CSC) was directed to classify and reorganize the civil service. While the new Act brought government engineers under the CSC's jurisdiction and extended the merit system of competitive examinations to the entire civil service, government engineers were still unhappy; they were apprehensive about receiving fair pay increases. In the past, the CSC had not recognized their educational qualifications and salary inequities persisted between technical and non-technical employees.[85] Complaining that there were no technically trained men on the CSC,[86] the EIC mounted a powerful lobby to influence the Commission's recommendations. As influential councillors lobbied the CSC and government ministers, the branches approached local Members of Parliament. The Ottawa Branch established a close liaison with the Government, while its publicity committee furnished the press and Members of Parliament with favourably inclined information.[87]

Although the EIC became involved in this lobby more by circumstance than design, it effectively established an important precedent. As Fraser S. Keith observed:

> ... for the first time in the history of a purely professional organization an active concerted effort has been made to advance the material welfare of a section of its membership, and established a definite policy by the Institute from which it was never intended to recede.[88]

Thus, by 1920, the EIC generally accepted that it should help improve the material welfare of individual members; but, it had no official policy.

In April, 1920, at the urging of Ontario members, the EIC appointed a Committee on Policy,[89] under the chairmanship of John Challies, a thirty-nine year old government engineer,[90] to define the future objectives and policy of the Institute.[91] After careful study, the Committee recommended that the EIC broaden its objectives to "promote the professional, the social and the economic welfare of the members ..."[92] This and other recommendations institutionalized existing practice to lay the basis of EIC policy for many years.

Although the conservatives were pledged to promote the material welfare of individual members, they were not fully committed to the idea. They seemed to recognize its contradictory implications: the EIC could not promote self-interest and remain a learned society. They viewed the new policy recommendations as an unfortunate but necessary temporary expedient, a pretense designed to placate dissent, in order to preserve the Institute as a learned society and protect their corporate interests. They would help, or at least appear to help, provided the EIC's professional status was not compromised. The same approach had been revealed a year earlier by the EIC's response to the Civil Service Commission's recommendations.

The publication of the CSC's long report on classification, in June, 1919, prepared by the American consulting firm, Arthur Young and Company, (The Classification of the Civil Service of Canada), caused an immediate uproar throughout the civil service.[93] Surveyors were angry and mining engineers characterized it as "unfair and discriminatory".[94] But the harshest criticism, from an engineer's viewpoint, came from the Engineering Council in New York.[95] Arthur S. Tuttle, chairman of the Council's Committee on Classification and Compensation, concluded that the report failed to "group engineering service along orderly lines, that it provides too narrow limits for promotions within a grade, and that the compensation proposed for all grades is inadequate for the service rendered ..."[96] This last criticism was the major source of complaint among engineers. Believing that wartime inflation was a temporary aberration, the consultants calculated salaries in relation to pre-war prices and proposed a cumbersome, ad hoc system of special "war bonuses" to bridge the transition, pending the return of pre-war prices.[97] Prices, however, continued to rise and government engineers were outraged.[98] Opposition to the report, from all quarters, grew so intense that the CSC decided to revise it.

In spite of strong opposition to the report among government engineers, and even "considerable dissatisfaction"[99] in Council, the EIC strongly endorsed it and tried to stifle criticism within the Institute. The Council argued that, while the report was not perfect, it had important advantages; it raised the government engineer's status, increased his pay and provided for the review of individual grievances.[100] The Council also cautioned that if a new civil service bill — containing a revised classification — met concerted opposition, it might be defeated and lost. This raised the possibility of a return to government patronage,[101] a system which had ravaged government engineering departments and discriminated against engineers. Warning that some politicians were scheming to re-establish patronage, the Council recommended acceptance of the bill and urged members to refrain from "expressing any personal dissatisfaction".[102]

While the conservatives had grounds to fear the return of patronage,[103] they had another more compelling reason for endorsing the CSC's report. Feeling uneasy about the EIC's compromising role as a pressure group, they argued that they had already achieved their major objective: government engineers' salaries were improved without damaging the Institute's status as a learned society. Later, when confronted with the threat of collective bargaining, the EIC undermined the immoderate branch salary schedules with the same methods it had developed earlier to block opposition to the CSC's recommendations.

On 23 March, 1920, in response to mounting pressure within the EIC to improve salaries, the Council appointed a Committee on Remuneration to study salaries and to coordinate branch studies.[104] One month later, the Council directed this Committee to prepare a salary and fee schedule.[105]

Although traditionally opposed to salary schedules,[106] the conservatives were not opposed to increasing salaries. They had always maintained that engineers were underpaid. Believing that income often determined social status, they viewed the salary schedule as an opportunity to raise salaries and, thus, increase professional prestige — their long term objective. Their immediate problem, however, was to check collective bargaining. The salary schedule was a means to that end. By establishing a national EIC schedule, the conservatives planned to supplant and, thereby, neutralize the potentially dangerous branch schedules. Thus, adopted by necessity, the salary schedule became the main defense against collective bargaining. The major tactical problem was to make it appear useful to appease young dissidents, whilst undermining it to render it harmless and thus protect the EIC.

Instead of preparing their own schedule, the Committee on Remuneration adapted a schedule prepared by the Engineering Council, New York.[107] The Committee argued that this schedule was superior to others and maintained that the preparation of another would be an unnecessary duplication. This choice was significant. Founded in 1917 by conservative American engineering societies, the Engineering Council's chief purpose was to forestall the AAE by blunting its initiatives with conservative counter proposals.[108] Its salary scale was not only lower than the AAE's, but significantly lower than some EIC branch schedules. The recommended salary minimum of the Toronto Branch, for example, averaged two hundred dollars a year more than the AAE's minimums and the Manitoba scale was even higher.[109] Adapting the Engineering Council's schedule, therefore, was a means to circumvent the radical branch schedules, in order to impose a moderate scale. As well, on the pretext that high salary demands might alienate employers and encourage undercutting by non-EIC members, the Committee substantially lowered the Engineering Council's modest salary scale[110] to render it almost completely ineffective. Even Fraser S. Keith was moved to condemn the action as a "mistake".[111]

Ultimately, time undermined the proposed salary schedule. The Committee took over three and a half years to submit its final report. During this period it tactfully absorbed and stifled radical dissent, simply by outlasting it. As the cost of living declined,[112] after 1920, the salary dispute gave way to new controversies. Although engineers would continue to complain about inadequate compensation, the committee had shielded the EIC from collective bargaining, while it appeared to serve ordinary engineers.

Perhaps the Committee on Remuneration's most significant achievement was to subtly alter the EIC's attitude to its members' economic problems. The branches looked to collective action to improve salaries. Although reluctant to form a union, they were prepared to use their collective strength, informally, through salary schedules, to confront, and perhaps to coerce employers. By contrast, the Committee on Remuneration believed that engineers must improve their salaries as individuals, not as a group. It asserted:

> The larger part of any material improvement must come from the action of the members of the profession themselves. The value the individual member of the profession places upon his services and the remuneration he insists upon [illegible]

> the long run, be the greatest factor in bringing about a financial improvement in the profession.[113]

The Committee thus re-established the Institute's traditional conservatism and repudiated the recommendations of the Committee on Policy. Moreover, in re-establishing the principle that an engineer's financial welfare was an individual, not a collective responsibility, the Committee effectively closed the door to union development in the EIC.

V

Manipulating the salary schedule was not a substitute for improving salaries, much less a credible alternative to collective bargaining. Although inflation declined, the financial condition of most salaried engineers did not substantially improve. The ineffective EIC salary schedule did not raise salaries and junior engineers continued to feel insecure. They recognized that the EIC was not serving their professional and economic interests, because it was still committed to the ideal of a learned society. Lacking alternatives, they began to reconsider Alan Macdougall's plan for licensing. Ironically, in protecting the EIC's professional dignity, the conservatives inadvertently weakened their position. While the EIC's assistance to members was more apparent [illegible] neers. Combined with the Committee on Policy's recommendations, the Institute's assistance legitimized the novel idea that the EIC should promote the economic interest of individual members. When grass roots pressure arose for political action to protect engineers, the conservatives would no longer have alternatives to, nor convincing arguments against licensing.

NOTES

[1] R.E.W. Hagarty to Editor, Canadian Engineer, 17 (22 Oct. 1909) p. 468. cf W.H. Finley's remarks, years later: edit. "Toronto Engineers Discuss Salaries", Ibid., 36 (6 March, 1919) p. 288.

[2] Some believed that overcrowding and competition from incompetents and non-professionals tended to lower income. Others contended that engineers were simply too busy to secure better pay. Still others held that, unlike doctors and lawyers, engineers were unable to enforce standard fee tariffs and prevent unethical competitive practices. Hagarty to Editor, Canadian Engineer, p. 468; "Report of Annual Meeting", Canadian Society of Civil Engineers, Transactions [hereafter cited: Trans CSCE] XXII (1908) p. 37; Ibid., XXIII (1909) p. 147; "The Pay of the Engineer", Canadian Engineer 35 (11 July, 1918) p. 33; edit. "The Technical Man's Salary", Contract Record 32 (9 Oct. 1918) p. 804; Hyman Goldman to Editor, Canadian Engineer 34 (9 May, 1918) p. 409.

[3] University of Toronto Library, Canadian Society of Civil Engineers, Toronto Branch Papers MS 102 [hereafter cited: Toronto Branch Papers] Box #7, J.C.N.B. Krumm, "What the Institute Can Do", 28 Feb. 1919, p. 4.

[4] This figure is based on weighted retail prices (1913 = 100). See: Canada, Dominion Bureau of Statistics, The Canada Year Book, 1922-23, (Ottawa, 1924) pp. 752-753.

[5] "Branch News", Journal of the Engineering Institute of Canada [hereafter cited: Jour EIC] II (May, 1919) p. 421.

[6] Edit. "Salaries of Engineers", Canadian Engineer 22 (2 May, 1912) p. 608; J.G. Legrand to Editor, ibid., 34 (14 March, 1918) p. 229; "Pay of the Engineer", ibid., 34; edit. "The Salary Situation", Jour EIC II (5 May, 1919) p. 410; "Calgary Branch", ibid., IV (May, 1921) pp. 320-321; "Tenth General Professional Meeting", Jour EIC IV (Sept., 1921) p. 507; Toronto Branch Papers, Box #6, "Memorandum Presented to the Members of Parliament of the Lower Mainland of British Columbia by the Vancouver Branch of the

Engineering Institute of Canada", h.d. Some engineers believed that salaries had fallen since the completion of the CPR. See J.G. Legrand to Editor, p. 229.

[7] Unsigned Letter to Editor, Jour EIC II (Jan. 1919) p. 30.

[8] "Civil Service Commission of Canada", Canada Gazette, 51 (1 June, 1918) pp. 4221-4222. For the reaction to this and similar advertisements, see: edit. "Pay of the Engineer", p. 33; "Employment Bureau", Jour EIC I (July, 1918) p. 137; "Branch News", ibid., II (May, 1919) pp. 421-422; Unsigned Letter to Editor, ibid., II (June, 1919) p. 468.

[9] Edit. "Salaries of Engineers", Jour EIC II (Jan. 1919) p. 18.

[10] Calculated from: Canada, Department of Trade and Commerce, Sixth Census of Canada, 1921, Vol. III (Ottawa, 1927) [hereafter cited: 1921 Census III] pp. XIX-XX, Table XI. 1921 was the first year that aggregate income data was broken down and reported by individual groups. For more detailed data on plumbers' wages between 1901 and 1919, see: Canada, Department of Labour, Wages and Hours of Labour in Canada, 1901-1920, p. 8.

[11] Calculated from 1921 Census III, pp. 142-147, Table 37, and pp. XIX-XX, Table XI.

[12] Calculated from, ibid., pp. 152-153, Table 39.

[13] Calculated from, ibid., pp. 166-167, 182-185, 198-201, 218-219, 262-263, 284-287, 304-305, 318-321, 356-359, 382-385, 402-403, 436-439, Table 40.

[14] Ibid.

[15] Accounting for the outbreak of labour unrest preceding the Winnipeg General Strike, Professor David Jay Bercuson argued that not all workers were adversely affected by inflation. The contract and railway shop

machinists, for example, who usually provided the most radical leadership and led the most militant strikes, kept well ahead of inflation through large war-time wage increases. Labour strife erupted, not because these workers were becoming poorer, Professor Bercuson maintains, but, through fear, panic and prejudice, these workers mistakenly thought that inflation was destroying their wage increases and living standard. David Jay Bercuson, *Confrontation at Winnipeg: Labour, Industrial Relations and the General Strike*, (Montreal and London, 1974) pp. 33-34.

[16] Engineers income varied according to field of speculation. In 1921, mining engineers, the highest paid engineers, averaged $2,368.79 annually, while mechanical engineers, the lowest paid engineer, received only $1,650.52. Civil engineers earned $103.24 more than the average for all professional engineers. Calculated from *1921 Census III*, pp. 166-439, *passim*, Table 40. Occasionally, inflated estimates of engineering salaries circulated. The *Christian Science Monitor* concluded that engineers were the best paid professionals in the United States. ("Employment Bureau", *Jour EIC* I [Oct. 1918] p. 317) and the ASCE estimated that the average American engineer's salary was nearly $4,000.00 per annum. This figure was hotly disputed by the *Engineering Record* of New York, which observed that low salary data was missing and noted that the average salary of engineers, employed in the eastern district of New York State, was only $1,775.00. (edit. "Compensation of Engineers", *Canadian Engineer* 32 (25 Jan. 1917] p. 93). This figure was probably low, but more realistic. In Canada, the average salary in Alberta was estimated to be less than $2,100.00. ("Tenth General Professional Meeting", *Jour EIC* IV [Sept. 1921] p. 507). Nationally, it was $1,951.30, for all professional engineers. Calculated from *1921 Census III*, Table 40.

[17] "Halifax Branch", *Jour EIC* IV (June, 1921) p. 382; J.C. Legrand to Editor, p. 229.

[18] Calculated from *1921 Census III*, pp. 142-147, Table 37. For example, the total 1921 professional income of William Snaith, thirty-nine year old production engineer, was $4,680.00, twice the average civil engineer's salary. See: University of Toronto Library, William Snaith Papers, MS 42, Box #1, "Budget Book", 1921, n.p.

[19] H.A. Goldman, an assistant engineer for the Toronto Harbour Commission, contended that some older

engineers with twenty-five to thirty years professional experience, earned less than $1,500.00 to $1,600.00 a year. Hyman Goldman to Editor, p. 409.

[20] The EIC adopted this classification from the Engineering Council in the United States. "Report of Committee on Classification and Remuneration of Engineers", Jour EIC V (Nov. 1922) p. 541.

[21] The career of one young Calgary engineer was typical. Beginning in 1903 as a $30.00 per month tapeman for the CPR, J.H. Greenwood, twenty-one, advanced through a variety of sub-professional jobs, before his promotion, in 1906, to resident engineer at $125.00 per month. EIC Montreal "Ancient Applications", J.H. Greenwood, Application to EIC, "Details of Experience in the Field" (insert). Mining engineers also went through a similar kind of sub-professional apprenticeship, before they were considered qualified to hold a responsible professional position. See eg: D.R. Thomas to Editor, Canadian Mining Institute Monthly Bulletin, No. 89 (Sept. 1919) p. 968.

[22] For example, they comprised 90 percent of the staff of railway engineering departments, edit. "Increased Salaries for Railway Civil Engineers", Jour EIC I (3 July, 1918) p. 235.

[23] In 1921, engineers, between 20 and 24, averaged only $2.76 more per week than Federal and Provincial Government clerks and $3.14 more than plumbers (calculated from 1921 Census III, pp. 142-147, Table 37). In 1920, while draughtsmen with the Canadian National Railway earned $60.00 a year more than CNR general clerks, roadmen made $390.00 less than the clerks. "Statement of Salaries", Jour EIC III (Feb. 1920) p. 101.

[24] Full members were required to be at least thirty years old and have twelve years professional experience, five in responsible charge. By contrast, associate members could be twenty-five years old, with only six years professional experience, two in responsible charge. Engineering Institute of Canada, By-Laws of the Engineering Institute of Canada (Montreal, 1919) p. 4.

[25] While engineers between 25 and 34 averaged $36.68 per week, in 1921, electricians and plumbers earned only $28.49 and $25.78 respectively. Calculated from 1921 Census III, pp. 142-147, Table 37.

[26] Ibid. Even locomotive firemen, brakemen and trainmen averaged slightly more than engineers in the 20 to 24 age group. Ibid.

[27] Interview, E. Donald Grey-Donald, 19 July, 1977, Montreal.

[28] "Manitoba Engineers Pledged to Salary Schedule", Canadian Engineer 39 (11 Nov. 1920) p. 506.

[29] While most engineers regarded middle-class status as a vocational obligation, some saw it as a right, or even a class privilege. Noting the engineer's difficulty in maintaining his social position, one engineer contended that the "engineer feels that even though he is associated with the labouring classes during working hours, he should have the same privileges of any other liberal profession ..." Romeo Morrissette to Editor, ibid., 38 (8 April, 1920) p. 357.

[30] Frederick B. Goedick to Editor, ibid., 34 (23 May, 1918) p. 469; N.C. Mills to Editor, ibid., 37 (23 Dec. 1919) p. 562; R.O. Wynne-Roberts, "A Generation of Engineering in Canada", ibid., 38 (29 Jan. 1920) p. 170.

[31] Edit. "Toronto Engineers Discuss Salaries", ibid., 36 (6 March, 1919) p. 288.

[32] J.F.P. Tate to Editor, ibid., 39 (25 Nov. 1920) pp. 501-502; "Pay of the Engineer", ibid., 35 (11 July, 1918) p. 33; University of Toronto Archives, Haultain Papers, B 47 (B-72-005) Box #4, Fraser S. Keith, "Engineering Education", 8 May, 1924, p. 9.

[33] J.G. Legrand to Editor, p. 229.

[34] For an analysis of the relationship between engineering and business, see: Edwin T. Layton, Jr.,

The Revolt of the Engineers: Social Responsibility and the American Engineering Profession, (Cleveland, 1971) Chap. 1.

[35] N.C. Mills, managing director of a Montreal mechanical engineering works, stated that "Many of the so-called leading engineers are 'leading' because they control the living of other engineers and the leaders could not hold their jobs unless they kept wages down." N.C. Mills to Editor, Canadian Engineer, p. 562.

[36] "... when you elect as the president of the Engineering Institute one of the wealthiest men in Canada", remarked William Snaith, "you will have a splendid president but you should not expect too much in the way of increased salaries." "Should Professional Engineers Organize Union?" ibid., 39 (11 March, 1920) p. 284.

[37] Fred Christie to Editor, ibid., 37 (18 Dec. 1919) p. 551.

[38] "Toronto Branch Committee on Prestige and Influence", Jour EIC, I (June, 1918) p. 100; "Salaries and Fees Committee", Toronto Branch, Engineering Institute of Canada, Yearbook (1919) p. 9; "Remuneration", Jour EIC III (Dec. 1920) p. 578; edit. "Compensation of Engineering Services", ibid., II (Nov. 1919) p. 730; Layton, Revolt of the Engineers, p. 134.

[39] Council Minutes, 7 April, 1919, p. 43; "Toronto Engineers' Policy Discussion", Canadian Engineer, 39 (21 Oct. 1920) p. 447.

[40] R. Snodgrass to Editor, Canadian Mining Journal, 41 (2 July, 1920) pp. 540-541; "British Columbia Technical Association Active", Canadian Engineer, 40 (12 May, 1921) p. 459.

[41] Snodgrass to Editor, p. 540; "Vancouver Branch", Engineering Journal V (March, 1922) pp. 159-160.

[42] "A Vocal Organization for B.C. Engineers", ibid., (July/August, 1978) pp. 18-19.

[43] "Toronto Engineers' Policy Discussion", p. 447.

[44] The best study of the AAE is: William G. Rothstein, "The American Association of Engineers", Industrial and Labor Relations Review, 22 (Oct. 1968) pp. 48-72.

[45] "Canadian Association of Engineers", Canadian Engineer 34 (7 March, 1918) p. 198; "Canadian Association of Engineers", ibid., 34 (25 April, 1918) p. 376.

[46] Toronto Branch Papers, Box #5, H.A. Goldman to P. Gillespie (Personal) 6 March, 1918; ibid., Goldman to Gillespie, 22 March, 1918.

[47] Professor Haultain believed that, even if engineers were licensed, some form of a union, purged of its "objectionable features", was inevitable, since they had no other means to protect themselves and raise their salaries. "Toronto Engineers Demand Action on Salaries", Canadian Engineer, 38 (11 March, 1920) p. 285; "Classification and Remuneration of Engineers", ibid., 43 (26 Dec. 1922) p. 662.

[48] See: "Should Professional Engineers Organize Union?", ibid., pp. 281 ff.

[49] Charles A. Mullen, "Trade Unions and Engineers", Contract Record, 34 (28 Jan. 1920) pp. 76-77; Fred Christie to Editor, Canadian Engineer, p. 551; "Pay of the Engineer", p. 34.

[50] Mullen, "Trade Unions and Engineers", p. 78.

[51] Ibid., p. 76.

[52] See William Snaith's argument: "Should Professional Engineers Organize Union?" pp. 281-285; Fred Christie to Editor, p. 551; N.C. Mills to Editor, p. 562.

[53] In March, 1920, over one hundred engineering and architectural draughtsmen formed Local 40 of the Inter-

national Federation of Technical Engineers, Architects and Draughtsmen, or, as it became known, the "Draughtsmen's Union". It had over 5,000 members in the United States and was affiliated with the American Federation of Labor. A local had been organized in Montreal and another was planned for Hamilton. While the history of this union is obscure, it is clear that it was not highly regarded by professional engineers. EIC members did not join, probably because it admitted non-professionals, such as draughtsmen, as well as engineers ineligible for EIC membership. "Should Professional Engineers Organize Union?", p. 283; "Toronto Draughtsmen Form Labour Union", Canadian Engineer 38 (1 April, 1920) p. 336.

[54] Engineers were also aware of the danger of becoming involved in a sympathetic strike, if they organized across industrial lines. This would have been unacceptable to most engineers after 1919. See Professor Peter Gillespie's remarks: "Should Professional Engineers Organize Union?", p. 283.

[55] N.V. Nelles, "Introduction", to T.C. Keefer, Philosophy of Railroads and Other Essays, ed. H.V. Nelles, (Toronto, 1972) p. LI.

[56] Layton, Revolt of the Engineers, pp. 9-10.

[57] Robert Bothwell and William Kilbourn, C.D. Howe: A Biography, (Toronto, 1979) p. 15.

[58] Ibid., p. 17.

[59] See Chapter I, pp. 23-24.

[60] "Toronto Engineers Demand Action on Salaries", (Professor C.R. Young) p. 286.

[61] "Should Professional Engineers Organize Union?", p. 283.

[62] "Salaries and the Civil Service", Jour EIC, II (June, 1919) p. 463.

[63] Ibid.

[64] "Fifth General Professional Meeting", (President R.W. Leonard), ibid., II (Oct. 1919) p. 645.

[65] Mullen, "Trade Unions and Engineers", p. 78. Recalling Aesop's fable about the bat who declined the offer of the mice to be their king, because he thought he was a bird, William Snaith observed that "if the engineer feels that he is an ally of capital, is it not possible that he may be giving up his position as king of labor?" "Should Professional Engineers Organize Union?", p. 284.

[66] Edit. "EIC Committee on Policy", Canadian Engineer, 39 (9 Sept. 1920) pp. 335-336.

[67] Rothstein, "The American Association of Engineers", p. 59; Toronto Branch Papers, Box #5, H.A. Goldman to P. Gillespie (Personal), 6 March, 1918, p. 2.

[68] Ibid., George H. Hogarth to Fraser S. Keith, 11 March, 1918.

[69] Council Minutes, 21 Dec. 1920, p. 105; Snodgrass to Editor, p. 541. The BCTA was expected to suspend operations shortly after the establishment of a provincial licensing association for professional engineers. It continued to function for a time, however, for the benefit of non-professional members who could not register under the B.C. Professional Engineers' Act. "Vancouver Branch", Engineering Journal, p. 160.

[70] Toronto Branch Papers, Box #5, F.S. Keith to Hogarth, 12 March, 1918; ibid., Keith to Hogarth, 13 March, 1918; ibid., Keith to Hogarth, 3 April, 1918; ibid., Minutes: Toronto Branch, Vol. III, 12 April, 1918, p. 195.

[71] Ibid., H.A. Goldman to P. Gillespie, 22 March, 1918.

[72] "New Association Suspends Meeting", Canadian Engineer, 34 (23 May, 1918) p. 472.

[73] Council Minutes, 27 April, 1920, pp. 34-35; "Report of Council Meeting", Jour EIC II (June, 1918) p. 470; "A.A.E. Will Stay Out of Canada", Canadian Engineer, 36 (12 June, 1918) p. 535. The AAE upheld its decision and refused applications from Toronto and Quebec. "Report of Council Meeting", Jour EIC II (Sept. 1919) p. 619.

[74] Toronto Branch Papers, Box #7, Council Minutes (copy), 18 May, 1920, p. 3.

[75] Ibid., 20 July, 1919, p. 1; Council Minutes, 22 June, 1920, p. 63; ibid., 20 July, 1920, p. 67; edit. "Co-operation for Mutual Benefit", Jour EIC III (July, 1920) p. 357.

[76] See Chapter VI, p. 204.

[77] "Salaries and Fees Committee", Toronto Branch Yearbook (1919) p. 9; Toronto Branch Papers, Box #7, Letter from W.S. Harvey, 10 March, 1919; "Branch News", Jour EIC II (May, 1919) p. 419; "Toronto Branch Salary Schedule", ibid., II (Nov. 1919) p. 731.

[78] Letter to Editor, ibid., I (Nov. 1918) p. 364; edit. "Toronto Engineers Discuss Salaries", Canadian Engineer, p. 288; edit. "Adopt the Institute's Scale", ibid., 38 (1 April, 1920) p. 349; J.F.P. Tate to Editor, ibid., p. 562.

[79] Rothstein, "American Association of Engineers", pp. 59-60.

[80] "Report of Council For the Year Nineteen Hundred and Nineteen", Jour EIC III (Feb. 1920) p. 70.

[81] "Winnipeg Branch", ibid., (Nov. 1920) p. 544; "Recommended Salaries for Manitoba Engineers", Contract Record, 34 (3 Nov. 1920) p. 104; edit. "Manitoba Engineers Pledged to Salary Schedule", Canadian Engineer, 39 (11 Nov. 1920) p. 505; "Manitoba Engineers to Enforce Salary Schedule", Engineering News-Record, 85 (18 Nov. 1920) p. 1013.

[82] "Toronto Engineers Demand Action on Salaries", Canadian Engineer 38 (11 March, 1920) p. 286.

[83] John H. Ryckman to Editor, Canadian Engineer 38 (25 March, 1920) p. 329; "EIC Committee on Policy", ibid., p. 335.

[84] P.E. Doncaster to Editor, Jour EIC I (Dec. 1918) p. 435; "Report of Council for the Year Nineteen Hundred and Eighteen", ibid., (Feb. 1919) p. 60.

[85] "Report of Council Meeting", ibid., I (Dec. 1918) p. 405.

[86] P.E. Doncaster to Editor, p. 435; "Report of Council Meeting", ibid., I (Nov. 1918) p. 435.

[87] Edit. "Government Considering Salaries", ibid., II (Feb. 1919) p. 121; "Branch News", ibid., p. 132; edit. "Increasing Remuneration", ibid., (April, 1919) p. 335; edit. "The Salary Situation", ibid., (May, 1919) p. 410; "Ottawa Branch", ibid., (Aug. 1919) p. 512.

[88] "Notable Engineering Conference", ibid., III (May, 1920) p. 252.

[89] For background on this important committee, see: edit. "Engineering Institute Council Discusses Salaries and Unionization", Canadian Engineer, 38 (22 April, 1922) p. 411; "Notable Engineering Conference", pp. 252-253; J.B. Challies to Editor, Jour EIC IV (Feb. 1921) pp. 65-66; "Report of Committee on Policy", Engineering Journal, 5 (June, 1922) pp. 329-335.

[90] Challies was Director of the Water Power Branch, Department of the Interior, Ottawa, and Honorary-Secretary of the Honorary Advisory Council for Scientific and Industrial Research. J.W. Leonard, Who's Who in Engineering, (New York, 1925) p. 249.

[91] "Report of Committee on Policy", Engineering Journal, p. 329.

[92] Ibid., p. 330 (italics added).

[93] Edit. "The Civil Service Bill", *Jour EIC*, II (Aug. 1919) p. 561; "St. John Branch", *ibid.*, p. 572; J.E. Hodgetts, *et al.*, *The Biography of an Institution: The Civil Service Commission of Canada, 1908-1967*, (Montreal and London, 1972) p. 69.

[94] Edit. "Remuneration of Surveyors", *Canadian Engineer*, 38 (18 March, 1920) p. 314; "Salaries of Mining Engineers in Government Service", Canadian Mining Institute Monthly *Bulletin*, No. 88 (Aug. 1919) p. 893; "Salaries of Technical Officers in the Civil Service", *ibid.*, p. 111.

[95] The Engineering Council was keenly interested in Canadian Civil Service reform, because Arthur Young and Co. were implementing a similar classification plan for the United States Congressional Committee on reclassification and compensation of government employees. "Criticizes Canadian Salary Ratings", *Engineering News-Record*, 83 (4 Sept. 1919) p. 486.

[96] *Ibid.*, p. 487.

[97] *Ibid.*, edit. "The Civil Service Bill", p. 561; Hodgetts, *The Biography of an Institution*, p. 70.

[98] One important manifestation of this discontent was the formation of the Professional Institute of the Civil Service of Canada. Organized on the initiative of John Challies and the Ottawa Branch EIC, it was dissatisfied with inadequate salaries and inconsistent application of the classification to professionals. *Ibid.*, p. 72; John Swettenham and David Kealy, *Serving the State: A History of the Professional Institute of the Public Service of Canada, 1920-1970*, (Ottawa, 1970) pp. 7-8.

[99] "Council of the Engineering Institute Supports Bill Classifying Civil Service", *Canadian Engineer*, 37 (23 Oct. 1919) p. 407.

[100] *Ibid.*, "Presidential Address" (R.W. Leonard), *Transactions of the Engineering Institute of Canada*, XXXIV (Jan. 1920) p. 16; "Special Notes", *Jour EIC*, II (July, 1919) p. 524.

[101] Edit. "Classification and Compensation of Engineers", ibid., II (Oct. 1919) pp. 680-681; edit. "Remuneration of Engineers", ibid., III (April 1920) p. 198.

[102] Edit. "Classification and Compensation of Engineers", p. 681.

[103] By 1921, for example, E.K. Spinney introduced a bill into the House of Commons that proposed to remove a large number of civil servants, including all professional, scientific and technical officers from the CSC's jurisdiction. For the EIC's official response, see: edit. "Engineers and Patronage", ibid., IV (June 1921) pp. 354-355.

[104] "Remuneration of Engineers", ibid., III (April 1920) p. 198.

[105] Council Minutes, 27 April, 1920, p. 33; "Committee on Policy", p. 65.

[106] "EIC Committee on Policy", p. 335.

[107] "Classification, Remuneration and Tariff of Fees of Engineers", Engineering Journal, 6 (Oct. 1922) p. 461.

[108] See: Layton, Revolt of the Engineers, p. 124.

[109] "Classification and Salaries of Engineers", Canadian Engineer, 37 (23 Oct. 1919) p. 398; The Manitoba Branch recommended that $3,300.00 a year be set as the basic minimum salary for an engineer performing the lowest order of professional service. This was $1,000.00 a year more than the average civil engineer's salary in Canada. "Recommended Salaries for Manitoba Engineers", p. 1046.

[110] "Classification, Remuneration and Tariff of Fees of Engineers", p. 463.

[111] "Tenth General Professional Meeting", Jour EIC IV (Sept. 1921) p. 509.

[112] The Cost of Living Index on retail prices fell from a high of 190.8 in July, 1920 (compared with 100 in 1913), to 149.6 in December, 1922. Canada Year Book, 1922-23, p. 753.

[113] "Classification, Remuneration and Tariff of Fees of Engineers", p. 463.

Chapter IX

"A SORT OF TRADE UNION"
THE EIC AND LICENSING

Throughout the war, the climate of opinion among rank and file CSCE members began to change in favour of political action. As more and more engineers complained of inadequate compensation, the technical press devoted increasing editorial space to the subject of licensing and several CSCE branches passed resolutions in support of closing the profession. By 1918, the EIC was committed to an ambitious licensing campaign. Although the Institute again encountered strong opposition from mining interests, the EIC was more united and determined, more adroit and politically sophisticated in its drive to overcome opposition and restrict competition by means of licensing.

I

In August, 1918, the question of seeking restrictive licensing legislation was introduced formally at the CSCE's second annual Professional Meeting in Saskatoon. In a paper entitled "Legislation Concerning the Status of Engineers",[1] F.H. Peters, Commissioner of Irrigation, Department of the Interior, Calgary,[2] argued that legislation was the best way to improve the status of engineers.[3] This suggestion, endorsed by the Calgary Branch,[4] met with the general approval of the meeting. Peters explained that the Calgary Branch's decision to press for legislation developed from a "special feeling of dissatisfaction ..." concerning the engineer's unsatisfactory financial situation.[5] Engineers, he said, had developed Canada's natural resources and industries, but received "neither the remuneration, nor the respect" they deserved.[6] By October, 1918, major EIC branches in the west and east had endorsed Calgary's stand on legislation. Realizing that there was, as Fraser S. Keith observed, an "incessant demand for legislation throughout Canada",[7] on the first of October, 1918, the Council endorsed the principle of obtaining restrictive licensing legislation.[8]

While some EIC members were strongly opposed to licensing legislation, the majority were clearly in favour.[9] Consulting engineers viewed licensing as a means of regulating competition, whereas government engineers believed that it would help to eliminate patronage and give them professional standing similar to Dominion and Provincial Land Surveyors. For most salaried engineers, especially those in low paying corporate or government positions, licensing would not only improve status, it would also increase salaries. Although these engineers were motivated by pecuniary considerations, they did not expect licensing to immediately improve their income. Only unionization, some argued, could accomplish that. Instead, legislation was, as Peters cautioned, a "means to an end";[10] it would improve salaries indirectly. While salary schedules and other devices might achieve some short term results, licensing was the only long term, permanent solution. By eliminating 'unqualified' practitioners who discredited the profession, licensing would improve the engineer's status and thus, presumably, increase his salary.[11] C.C. Kirby, Chairman of the St. John Branch, later explained that, in addition to protecting the public, the object of licensing legislation was to "improve the status of the engineer ... and thereby obtain better recognition and consequently better remuneration ..."[12]

II

In their determination to increase salaries by licensing, engineers had not entirely forfeited their idealism, nor become obsessed with personal gain. If anything, the war had revitalized their idealism and given them renewed purpose. Believing that they had saved civilization from destruction during the war, their new mission was to increase industrial production to enable Canada to survive in the great commercial struggle expected after the war.[13] Above all, after witnessing wartime inefficiency, they were more convinced of the need for engineers to lead the post-war world. However, while the war uplifted their spirits, it also disheartened them; wartime inflation forced them to consider the more immediate and mundane problems of jobs and salaries.

By 1918, one of the most serious problems faced by junior engineers in Canada, as well as in the United States and Great Britain, was increased competition arising from an over-supply of engineers.[14] In Britain, for example, during the first three years after the war, an unprecedented number of engineering school graduates, combined with older more experienced men returned from former overseas possessions, created an over-supply.[15] In Canada, apprenticeships traditionally regulated supply. But, a decade of unprecedented economic growth, preceding the First World War, substantially increased demand.[16] After 1904, the immigration of European and American engineers to build the transcontinental railways and, more importantly, the establishment of new engineering schools (particularly in the west) soon filled the demand — but overcrowded the profession.

In the seventy years between 1891 and 1961, the engineering profession in Canada grew faster than the general population, labour force and all other professions.[17] Statistically, although this growth was not sustained in the 1921-31 decade,[18] the profession continued to expand rapidly during the immediate post-war years. By 1921, the EIC had nearly 4,900 members, a remarkable five year growth rate of approximately 1,800 new members,[19] most of whom were young engineers. During the war, the CSCE's associate and full member class increased at a constant rate, but student membership fluctuated. After 1918, student memberships grew relatively as fast as associate and full memberships.[20] This growth was caused by the engineering schools. By the end of the nineteenth century, the older schools were already graduating engineers in excess of demand and some graduates were forced to seek work in the United States.[21] After 1918, Canadian engineering schools, like their British and American counterparts, expanded dramatically. Whereas only 237 Canadian engineering degrees were granted in 1920, 629 were granted in 1923, a number not surpassed until 1935.[22] Returned soldiers accounted for much of this short term growth. For example, of the total number of University of Toronto engineering students who wrote spring examinations in 1919 (772), over half (394) were ex-soldiers.[23]

Overcrowding depressed salaries and increased competition. With a large supply of engineers on hand, employers could lower salaries. When demand declined during a depression, or in the absence of large construction projects, competition for low paying jobs became sharp. Emigration to the United States did not significantly reduce the over supply and few engineers were willing to forsake the profession after years of study and professional practice.[24]

Junior professional engineers, like the thirty-five year old F.H. Peters, were more directly affected by overcrowding than other engineers. Between 1918 and 1921, while the number of full EIC members had increased by only 200 members, student members grew by 385 and, most significantly, the associate member class, containing most junior engineers, expanded by 579 members.[25] The ever increasing number of younger engineers threatened to intensify competition for jobs and promotions. Although the overall supply of engineers would moderate during the 1920s, in the immediate post-war period, the economic prospects of many junior engineers must have appeared bleak as depression threatened and inflation eroded purchasing power.

While other professions had strong organizations to protect their economic interest, junior engineers, such as Peters, realized that the EIC, as constituted, would do nothing to help them.[26] Other strategies to raise the engineer's status — membership in an exclusive professional society, publicity, public service — had failed. Unlike lawyers and doctors, engineers did not have regulatory powers to limit the supply of practitioners, or even fee tariffs to fix prices. As salaried employees, the only logical solution to their predicament was traditional labour methods — unionization. Having rejected this for social and philosophical reasons, the junior engineers turned to licensing to achieve similar ends. They believed that they had no other alternative. Moreover, as the EIC had undergone fundamental structural changes during the war, it now seemed opportune to press for political action.

Although the public statements of Peters and others were vague about how licensing would benefit engineers financially, most EIC members understood. Opinions varied about the relative effects of licensing,[27] but all agreed on its implications. Restricting competition to limit supply and drive up wages were, of course, classic trade union tactics and it was clear that some prominent engineers viewed licensing as a form of trade unionism. Professor H.E.T. Haultain, for example, characterized closed professions, such as law and medicine, as "a species of unionization"[28] and consulting engineer, R.O. Wynne-Roberts, observed that licensing would make the profession "a sort of trade union".[29]

Licensing, in many respects, was better than unionization. As a private interest group, engineers could not lobby for what were in effect, monopoly powers, on the grounds of self-protection.[30] But, as professionals, posing as enlightened altruists, they could restrict competition on the pretext of protecting the public. Thus, by rationalizing their self-interest in terms of serving the public interest, licensing could achieve the same results as unionization, in a 'dignified' way, without loss of professional prestige.[31]

Although engineers posed as altruists out of self-interest, they did not believe that they were acting cynically. They viewed this tactic as a legitimate means of discharging their social responsibilities, while solving their financial problems. No less public spirited than other contemporary middle-class Canadians, the engineers' social consciousness was modified by their technocratic outlook. Theoretically, in an ideal society correctly designed and efficiently managed by engineers, there would be few social problems for professionals to solve. Therefore, the concept of the independent consultative professional, intervening in society to protect the public interest, was not a well developed part of the engineer's social philosophy. In practical terms, however, they merely assumed that if only "qualified" engineers were licensed the public would be protected. The engineer's outward pretense of professionalism was merely a pragmatic political ploy to acquire professional regulatory power for noble ends. This would elevate engineers to a position of greater prestige, from which they could ideally aspire to their rightful place as leaders of a socially harmonious technocracy.

III

While the majority of EIC members favoured licensing, a small but important minority was staunchly opposed. These members tended to be older, well established engineers who stood at the head of the profession and occupied senior management positions in government and industry. Many had served as CSCE councillors and presidents; most had been associated with the Montreal Clique. Their opposition to licensing stemmed initially from their belief in the positive value of competition.

Conservative opponents of licensing saw competition as the matrix of professional achievement and material prosperity. In an expanding free market governed by natural law, they argued, competition eliminated incompetence and rewarded excellence. Licensing interfered with the natural order of things, stifled initiative and encouraged mediocrity. Moreover, the conservatives asserted that it was ungentlemanly to combine for class advantage at the expense of the community, as well as against those less privileged who honestly competed to become engineers. Engineering, like science, was classless. Licensing granted special privileges to an undeserving and unnaturally constituted elite. "If an engineer cannot stand on his own feet in competition with brother members of the profession", declared R.W. Macintyre, a prominent British Columbia engineer, "we certainly have no right to bolster him up by Act of Parliament and drag our profession downhill by so doing".[32] Licensing, conservatives argued, would not eliminate incompetents, but shield them; competence could not be legislated. The conservatives often observed that licensing had not prevented incompetents from practising law and medicine.[33] Echoing T.C. Keefer's assertion that engineers "sought only a free field and asked no favors",[34] the conservatives insisted that engineers must be free of all restraints in order to develop naturally. The marketplace was the only real public safeguard against incompetence and a guarantee of efficiency and prosperity.

Consistent with their nineteenth century views on the virtues of self-improvement, the conservatives maintained that the attainment of higher salaries was primarily an individual, not a collective responsibility. Engineers should be rewarded only for individual merit. Rather than adopt coercive trade union methods by organizing a "closed shop", they advised engineers to emulate the ICE and improve the EIC's prestige as a professional society. This, in turn, would improve their prestige and, ultimately, their remuneration. Expanding on this idea, G.R.G. Conway, Chairman of the Vancouver Branch, CSCE, and Chief Engineer B.C. Electrical Railway, asserted:

> The principal object of the leading national engineering societies is to raise the standards of the profession from time to time, so that only competent engineers shall be entrusted with the design and construction of engineering works, both public and private. Our object is not to attain that result by adopting the principles of trades unions ... but by increasing the value of our society so that it will be recognized that corporate membership has such a standing in the engineering world that our public authorities will appreciate the fact when entrusting the engineer to carry out public works.[35]

The conservatives conceded that engineers had not received the public recognition they deserved, in spite of their efforts to upgrade the EIC's professional stature. Rather than alienate public support by adopting trade union tactics, they suggested that engineers had only to serve the public and publicize their achievements, to improve their prestige.[36]

In spite of their objections to licensing, the conservatives could not influence majority opinion and stem the demand for political action. Shortly after the second annual Professional Meeting in Saskatoon, the CSCE took up the practical problems of drafting and promoting licensing legislation, with determination and skill.

At the Saskatoon meeting, the Legislation Committee of the Saskatchewan Branch presented a draft licensing bill for discussion. Intended as a model for other provinces, the bill was carefully studied, but referred back to the Committee for changes. A revised bill was later sent to the Council for approval, pending its introduction to the fall session of the Saskatchewan Legislature. However, perceiving wide variations in licensing bills prepared by other branches, on the first of October, 1918, Council asked Saskatchewan to withhold action. A second request, in December, was also turned down for similar reasons.[37] While Saskatchewan was angered at what it considered unnecessary delay,[38] a consensus was emerging from other branches. Considering the need for uniform provincial legislation, many branches felt that draft legislation should be thoroughly studied by all branches before any provincial legislature was approached. Following an earlier suggestion by the Montreal Branch, a special legislation committee, chaired by C.E.W. Dodwell, consisting of one delegate from each branch, was appointed at the EIC's Annual Meeting in Ottawa, in February, 1919, to draw up a sample licensing bill.[39]

In April, 1919, the fourteen member committee met for five exhaustive days in Montreal to draft a model act. Prepared as a standardized act for all provinces, the model act was more comprehensive than the Manitoba and Quebec

Acts. It prescribed stiff penalties for unlicenced engineers practising engineering or using the title "Professional Engineer". It also gave wide discretionary powers to governing councils, while making ample provision for licenced engineers of one province to practise freely in another.[40]

The outstanding feature of the model act was the provision for a separate licensing society, or Provincial Association. These bodies were designed to be independent from the EIC and equipped with full regulatory powers of professional self-government — administration, admission, discipline. Officially, the formation of the Provincial Associations was considered an "unavoidable" expedient to forestall the CMI's opposition.[41] Twenty years had passed since the CSCE had last sought licensing powers, but memories were still fresh of the CMI's opposition. Unofficially however, legal considerations may have been involved. The Legislative Committee's lawyer, Aimé Geoffrion, advised that the EIC could not obtain provincial legislation under its Dominion charter, as it had done earlier in Quebec.[42] Unlike the Manitoba Act, which incorporated the CSCE as a separate body in 1896, in Manitoba, the Quebec Legislative Assembly merely recognized the CSCE's Dominion charter and granted the Society special regulatory powers in Quebec. According to Geoffrion, the Quebec Act was probably void, because, under the British North America Act, a provincial legislature cannot impose obligations on a federal company.[43]

Although the Legislative Committee understood that the Provincial Associations, not the EIC, would effectively control the profession, it seems clear that the Committee believed that the EIC could still maintain its power and influence. If the EIC took the initiative to create the Associations, the Institute could dominate and control them. Later, as Geoffrion hinted, the Associations might be linked together by special Dominion legislation and then affiliated with the EIC.[44] Unfortunately, this never came to pass. Instead, the creation of the Provincial Associations marked the beginning of a long and bitter struggle with the EIC for control of the profession.[45]

In May, 1919, the model act was published in the EIC Journal. Two months later, the Council issued a letter ballot to the membership and, in September, the Journal announced that seventy-seven percent of the votes cast favoured the act.[46]

The conservatives responded pragmatically. While they were initially opposed to licensing for genuine philosophical reasons, the model act threatened some important vested interests. For instance, conservatives, such as G.H. Duggan and H.H. Vaughan, believed (somewhat prophetically) that the establishment of Provincial Associations would ultimately harm and, possibly, destroy the EIC. Duggan, CSCE past-president and President, Dominion Bridge Company, contended that, because Provincial Association membership would be compulsory, engineers would drop their EIC membership, rather than pay double dues. This would, according to Duggan, "almost certainly destroy the Institute".[47] This prospect must have been particularly distressing to successful men like Duggan and Vaughan, since one of the main benefits of EIC membership was prestige enhancement. At the same time, Duggan, Vaughan and other corporate employers undoubtedly realized that licensing would be bad for business. It would drive up salaries, because only licenced engineers, not tradesmen or practical men, could sign plans. As well, there would always be a danger that the Provincial Associations might act, directly or indirectly, as trade unions. Unlike the EIC, the Associations were constituted mainly to protect the engineer's professional and business interests.

Rather than attack the model act directly, the conservatives at first preferred to tactfully undermine it. In an attempt to turn younger supporters against the act, Vaughan, Duggan and others expressed the conviction, with some justification (despite disclaimers by some Legislation Committee members) that the model act would exclude most salaried engineers and benefit only consultants and chief engineers.[48] At the same time, Duggan and Vaughan also promoted the idea that, as an alternative to licensing, engineering legislation should only certify, or register "civil" engineers employed on public works. This option would win public approval, they predicted, while avoiding the stigma of unionism.[49] It was also an ideal compromise for the conservatives. Registration would distinguish non-professionals from professionals (EIC members), without closing the profession. In turn, this would uphold the principle of competition, raise the professional status of all engineers and, most importantly, relieve the emerging mechanical, chemical and electrical industries of the obligation to hire only licenced engineers.

In spite of their efforts to undermine the model act, the conservatives seemed resigned to its introduction. They never mounted an effective opposition, nor even argued their case forcefully and convincingly. Most, including Duggan and Vaughan, were compelled eventually to give their qualified approval to legislation. Substantially outnumbered by younger men determined to close the profession, the conservatives realized that the EIC had been gradually drifting away from its traditional role. By 1920, the Committee on Policy would commit the Institute to a policy of promoting the material interests of members and, thus, deprive conservatives of logical grounds to oppose licensing.

While the conservatives bemoaned restricting competition, they were more alarmed about unionism. During 1919, as the spectre of unionization loomed with the increase in the cost-of-living, many conservatives grudgingly accepted licensing as an unappealing alternative to unionization. Licensing, they rationalized, could achieve the same objectives as unionization, without sacrificing professional dignity.[50] It could also appeal to most junior engineers, even to some militant union supporters, as a positive liberal measure.

IV

The EIC recognized that the CMI was the biggest obstacle to licensing. Before it began its licensing campaign, the EIC attempted to pacify mining engineers. There were, as F.H. Peters remarked in Saskatoon, "some old sores of long standing between civil and mining engineers."[51] The CMI had always suspected that the CSCE was attempting to lure its young professional mining engineers away from their society with the promise of higher status through membership in an exclusively professional society.

The CSCE's change of name, in 1918, to the Engineering Institute of Canada, also generated more suspicion. According to H. Mortimer Lamb, CMI Secretary and Editor of the CMI's monthly Bulletin, the name change was part of a sinister plot to compel all engineers to belong to the EIC. A purely "civil" engineering society, Mortimer Lamb contended, could not obtain restrictive licensing legislation because of opposition from mining engineers and other technical men. Removing the word "civil" from the society's name, would overcome this opposition. It would first attract and then recruit enough non-civil engineers for the EIC, as a necessary prelude to closing the profession.[52] In this context, the EIC's renewed interest in licensing, combined with its public declarations that it was eager to unite all engineers and become a truly representative national engineering society, aroused old suspicions. Mortimer Lamb recounted that the Society was accused of having "ulterior motives"; that it had "hegemonic aspirations which it hoped to satisfy by using the lever of legislation to force all engineers in Canada into its ranks ..."[53] The EIC, he declared earlier, was "smitten with megalomania".[54]

Soon after the EIC's Saskatoon meeting, Fraser S. Keith wrote Mortimer Lamb to allay CMI anxieties. Legislation, Keith explained, was not only essential to protect engineers, but also to protect the public against the wasteful expenditure of public funds by unqualified practitioners. EIC licensing legislation, he pledged, would recognize all "qualified" engineers, including CMI members and licensing and regulatory powers would rest with an independent body appointed by government in conjunction with the universities.[55] On 22 December, 1918, senior EIC and CMI leaders, including G.H. Duggan and Mortimer Lamb, met in Montreal to discuss the draft Saskatchewan bill. Mortimer Lamb and his colleagues concluded that there was nothing in the bill that was offensive to the CMI and the meeting jointly resolved that the question of legislation should be carefully studied before any action was taken. While the CMI remained opposed to legislation in principle, pending further study it agreed to co-operate with the EIC in framing an acceptable act.[56] In April, 1919, Keith also promised that the EIC would not seek legislation that affected mining, without the CMI's approval.[57] These assurances, together with the publication of the model act in the CMI's June Bulletin, persuaded CMI leaders that the EIC was acting in good faith. Between August and September, 1919, Mortimer Lamb abruptly reversed himself and began to wax effusive about the merits of engineering fraternity and co-operation.

At this point, although less suspicious of the EIC's intentions, the CMI was still not well disposed to the idea of licensing. Unofficially, it was against legislation,[58] but recognized that it could do little to oppose it. Lacking the EIC's extensive branch network, the CMI was not organized to fight provincial legislation. Moreover, there was some support for legislation within the

CMI. By 1918, many members had a strong feeling[59] that something should be done to improve the engineer's status. Bogus mining engineers frequently wasted investment capital and consequently lowered the status of legitimate mining engineers. As a result, most CMI members favoured some form of regulation. "Every member of the Institute", Mortimer Lamb concurred, "will approve, without doubt, of the general proposition that legislation is needed for the better regulation of the practice of engineering in this country ..."[60] Unfortunately, CMI members disagreed about what kind of regulation was needed.

Reflecting an old division within the CMI, professional and non-professional members differed over the relative advantages of self, as opposed to government regulation. As well, a more important disagreement developed between young professionally trained mining engineers and older professional and non-professional CMI members. Like the EIC's junior engineers, the young men in the CMI were also ravaged by wartime inflation and had similar anxieties about status.[61] Whereas older engineers would accept voluntary registration — to enable the public to distinguish between qualified and unqualified mining engineers, provided no hiring restrictions were placed on employers[62] — young engineers were prepared to accept more drastic measures. At the same time, there was also much indifference to licensing legislation among many other mining engineers in Canada.[63]

These two factors, disaffection and apathy, alarmed senior CMI members. They feared the imposition of a close corporation on mining engineers as a result of indifference, combined with the tacit acceptance, perhaps active support of dissatisfied young mining engineers. Unable to stop licensing legislation, they resolved to render it harmless by removing the most objectionable feature: restrictions which might bar alien mining engineers from inspecting Canadian mine properties on behalf of foreign investors. Thus, apart from appointing committees to scrutinize provincial licensing bills and ensuring that no restrictions were placed on foreign investment in mining, the CMI reluctantly yielded to the EIC's legislative initiative.[64]

On 23 September, 1919, the Council of the EIC approved the model act and encouraged the branches to seek licensing laws from their provincial legislatures.[65] By spring, 1920, all provinces, except Saskatchewan, Prince Edward Island (which had too few engineers to license) and Ontario, had passed engineering licensing laws. Ontario, possessing over a third of the EIC's membership, was central to the Institute's legislation programme. Legislative success in this province was essential to close the profession nationally.[66] At first, prospects appeared good for obtaining legislation. There was no foreseeable opposition; the CMI was neutralized and the Drury Government seemed receptive. However, unlike other provincial bills, the Ontario bill soon encountered delays and unexpected opposition.

Ontario EIC members realized that they could not agitate for licensing through their extensive branch network. By 1918, the province had eight branches. Some centralized umbrella organization was needed to co-ordinate legislative strategy and lobby the government in strength.[67] EIC members in British Columbia and Alberta had already organized provincially. In August, 1919, in response to a request from Ontario members, Council approved the formation of an Ontario Provincial Division.[68]

Recognizing that the EIC did not include in its membership all the practising professional engineers in Ontario, the Ontario Provincial Division urged that engineers from all branches of the profession should be consulted about any licensing legislation. On 22 November, 1919, at the Ontario Provincial Division's first conference in Toronto, it was decided that a joint advisory committee could best represent the views of all engineers. Accordingly, in December, Ontario's leading professional engineering and technical societies were invited to send two representatives to form what was called the Advisory

Conference Committee.[69] These organizations included: the American Institute of Electrical Engineers, Toronto Branch; American Society of Mechnical Engineers, Ontario Section; Canadian Institute of Mining and Metallurgy (formerly the CMI); Canadian Society of Chemical Industry; Association of Ontario Land Surveyors and the Ontario Association of Architects.[70]

These organizations, ostensibly divided by technical specialization and professional rivalry, eagerly responded to the EIC's invitation, not only to protect their own interests and watch over the EIC, but also to fulfil a sense of social responsibility. The war effort had fostered a spirit of co-operation and joint action. "[N]ever was the time more opportune than at present", declared Mortimer Lamb, "for the organization in Canada of the technical bodies for united endeavour for the advancement, not only of the special interests they represent, but for national service ..."[71] In 1916, for example, engineers and scientists joined forces in the Honourary Advisory Council for Scientific and Industrial Research (National Research Council of Canada);[72] the Joint Committee of Technical Organizations (JCTO), 1917,[73] as well as the Canadian Engineering Standards Association (Canadian Standards Association), 1917, incorporated 1919.[74] The Advisory Conference Committee was founded in the best traditions of this wartime spirit of co-operation. It was part of an increasing tendency in Canada and elsewhere, during the war, towards the bureaucratization of science and technology.

Although drafting a complex bill by a large constitutent committee was cumbersome and time consuming, it had important advantages. As an independent advisory body, the Advisory Conference Committee was a practical demonstration of the EIC's good faith. This served to forestall a resurgence of opposition from mining engineers, while enabling the EIC to promote its licensing schemes through a broadly represented, non-partisan body. While the EIC had only two representatives, in spite of its numerical superiority over other societies represented on the Committee, it easily dominated it by its leadership and experience. Under Willis Chipman's chairmanship, the Committee quickly rejected a draft licensing bill prepared by the JCTO[75] and adopted the EIC's model act. Thus, by involving potential opponents in the Advisory Conference Committee, ostensibly as equal participants, the EIC adroitly averted opposition, while conveying an impression of unanimous voluntary co-operation.

Between March and December, 1920, the Advisory Conference Committee met to draft a bill. Overcoming the enormous difficulties of reconciling conflicting interests (a "considerable achievement" according to the Canadian

Engineer),[76] the Committee finally produced a bill which followed the general lines of the model act.[77]

In January and February, 1921, Advisory Conference Committee representatives urged their societies to endorse the bill on its general merits. They explained that each branch of the profession would be regulated separately and given equal representation on the governing council. This provision would prevent any one branch from gaining control of the profession. After further revision, the bill was approved by the constituent societies. In March, Major A.W. Gray, Associate Member EIC, the Ontario Legislature's only practising engineer,[78] took charge of the bill and the EIC began to lobby the Cabinet and Members of the Legislature. The bill passed first and second reading by 20 April, but a lengthy House adjournment delayed third reading for a year. Meanwhile, before the House met on 14 February, 1922, a Special Committee of the House exempted all mining operations from the bill.[79]

By 10 May, 1922, when the bill came up for third reading, no organized opposition had surfaced in the House. Suddenly, however, it became apparent that some influential Members would oppose the bill unless changes were made.[80] On 16 May, the bill was referred back to the Special Committee of the House, which struck out sub-sections (a) and (b) of clause 34. These unexpected last minute deletions fundamentally altered the substance of the bill. Originally, clause 34 read (deletions in italics):

> Any person in the Province of Ontario who, not being registered as a member of the Association in the Province of Ontario, or licensed by the Association;
>
> (a) *Practices as a professional engineer;*
>
> (b) *Usurps the function of a professional engineer;*
>
> (c) Uses verbally or otherwise the title of professional engineer, or makes use of any addition to or abbreviation of such title, or of any words, name or designation that will lead to the belief that he is a professional engineer or a member of the association, *or that he is a person specially qualified to practise in any branch of professional engineering;*
>
> (d) Advertises himself as a professional engineer in any way or by any means;
>
> (e) Acts in such a manner as to lead to the belief that he is authorized to fill the office of or to act as a professional engineer;
>
> shall be liable upon summary conviction by any court of competent jurisdiction to a fine of not less than $100 nor more than $200 for the first offence, and to a fine not less than $200 nor more than $500 for any subsequent offence.[81]

After "further mutilation",[82] as Willis Chipman recalled, such as the deletion of sub-section 34(e), the bill was reintroduced and passed third reading on 5 June, 1922.

The removal of the key penalty clauses reduced the Bill to an ineffectual registration law similar to the 1896 Manitoba Act. The engineering profession in Ontario remained "open". Anyone could practise; only the title "Professional Engineer" was restricted to members of the new Association of Professional Engineers of Ontario. The Act had established a system of voluntary certification, which only regulated the use of title, rather than licensure — which would have regulated practice.[83]

Although the EIC had tactfully forestalled opposition from mining engineers, it could not pacify the powerful northern Ontario mining industry. While professional mining engineers would accept some form of regulation, the mining industry unanimously opposed it. "Not one mine operator in the Cobalt camp", observed the _Northern Miner_, "is in favor of the [licensing] bill ..."[84] Licensing, mine owners believed, would interfere with the development of Canada's mineral resources and restrict their right to freely employ engineers of their own choice. It would not, moreover, guarantee the employment of the best engineers. Only employers who risked capital, not licensing bodies, could choose the best man.[85] Licensing bodies governed by engineers would simply promote the interests of engineers. According to R.E. Hore, consulting editor, _Canadian Mining Journal_, licensing bodies were "Class organizations", which became, he wrote, "most dangerous when they conceal their activities under a cloak of public service ..."[86] The _Canadian Mining Journal_ contended that most mining engineers were indifferent to licensing and, under ordinary circumstances, there would be little support for it. Advantage was being taken of the fact that licensing had become "a popular fad".[87]

To mine owners, licensing was a dangerous collectivist development, little different from unionism. Following the social and industrial upheaval in Canada and abroad after the war, they were, probably, as afraid of engineers forming a close corporation, as they were of mine workers organizing a union. Deeply alarmed, they used their considerable influence at Queen's Park to have the Special House Committee cripple the Ontario licensing bill before it became law.

V

By 1922, all provinces, except Saskatchewan and Prince Edward Island, had passed engineering licensing laws. Saskatchewan engineers would not overcome local opposition to licensing until 1930[88] and Prince Edward Island would not grant engineers full licensing and regulatory powers until 1955.[89] These laws differed in detail, but generally resembled the model act. Quebec was an exception. The Province merely transferred the 1898 Act from the CSCE to the new Corporation of Professional Engineers of Quebec.[90] In British Columbia, Manitoba, Quebec, New Brunswick and Nova Scotia, engineers succeeded in 'closing' the profession; no one could practise engineering, nor use the title "Professional Engineer", unless they were a member of the local Provincial Association.[91]

In Alberta and Ontario, however, engineering was still an 'open' profession. Because of strong opposition in the Alberta Legislature to the formation of a close corporation, the Alberta Bill, like the Ontario counterpart, was also downgraded to an ineffectual voluntary registration Bill. Only the title "Registered Professional Engineer" was protected by law. Although licensing proponents, such as F.H. Peters, first President of the Association of Registered Professional Engineers of Alberta, remained optimistic that the Act would be amended,[92] it was not until 1930 that registration was made compulsory. Penalties for illegal practice were not enacted until 1955.[93]

The Ontario Bill disappointed many engineers. Although William Storrie, Chairman, Toronto Branch EIC, believed that it was "a step in the right direction",[94] no immediate action was taken to improve it. The Ontario Government was resistant to the formation of close corporations, during the 1920s, and other groups, such as veterinarians and architects, could not obtain legislation to close their professions.[95] It was not until the 1930s that the Professional Engineers Act was amended. In April, 1934, the Association of Professional Engineers of Ontario (APEO) created an Advisory Committee on Legislation which succeeded in drafting a bill acceptable to the government and mining interests. It was presented as a private measure and received Royal Assent on 25 March, 1937. This amendment effectively 'closed' the profession and gave the APEO complete regulatory control over the practice of engineering in Ontario.[96]

Licensing did not solve all the engineers' problems. Like most middle-class professionals, they continued to complain about inadequate compensation and lack of recognition. Moreover, licensing did not entirely restrict competition. In most provinces, for example, qualified alien engineers could be licensed to practise temporarily, usually as consultants. Similar privileges were not permitted in the legal and medical professions. Nevertheless, licensing enabled scientifically trained engineers to gain substantial control of the profession. This was a major step towards the monopolization of the practice of engineering in Canada.

NOTES

[1] F.H. Peters, "Legislation Concerning the Status of the Engineer", Journal of the Engineering Institute of Canada [hereafter cited: Jour EIC] 1 (August, 1918) pp. 217-220.

[2] Peters was a distinguished RMC graduate and ICE and ASCE member. For a career profile, see: John William Leonard, Who's Who in Engineering: A Biographical Dictionary of Contemporaries, 1922-1923, (New York, 1923) p. 987.

[3] Peters, "Legislation Concerning the Status of the Engineer", p. 218.

[4] Ibid.; For a report of the Calgary Branch, prepared by Peters, explaining the need for legislation, see: "Defining the Status of the Engineer", Contract Record, 32 (March, 1918) pp. 177-178.

[5] Peters, "Legislation Concerning the Status of the Engineer", p. 217.

[6] Ibid.

[7] Edit., "Legislation", Jour EIC, I (Nov. 1918) p. 335.

[8] Council, however, set out three conditions: Provincial legislation must include all qualified engineers (not just EIC members), be uniform from province to province and allow registered engineers to practise in any province. Fraser S. Keith, "Engineering Legislation in Canada", Engineering News Record, 86 (Jan. 1921) p. 21.

[9] C.H. McLeod, "How Canadian Engineers Organize", Canadian Engineer, 32 (April, 1917) p. 342; Peters, "Legislation Concerning the Status of Engineers", pp. 219-220; R.O. Wynne-Roberts, "Engineering Prestige", Canadian Engi-

neer, 34 (April, 1918) p. 347. "No single subject is occupying the minds of engineers throughout Canada at the present time", observed F.S. Keith, "more than the question of securing legislation ..." edit., "Legislation", p. 335.

[10] F.H. Peters to Editor, Canadian Engineer, 34 (Feb. 1918) p. 141.

[11] "Message from Councillors" (Arthur Surveyer), Jour EIC I (June, 1918) p. 110; Peters, "Legislation Concerning the Status of Engineers", p. 218.

[12] C.C. Kirby, "Legislation in New Brunswick", ibid., III (July, 1920) p. 341.

[13] See Chapter VII, pp. 224-226.

[14] Other professions, such as Dentistry, also discovered that the supply of practitioners had far outstripped demand. See: D.W. Gullett, A History of Dentistry in Canada, (Toronto, 1971) pp. 96-97.

[15] See: E.J. Mehren, "Engineers and their Societies in Britain", Engineering News-Record, 93 (Sept. 1924) pp. 380-381.

[16] Elizabeth Fisher, "Professional Associations in Canada", (Unpublished Ph.D. Dissertation, University of Toronto, 1932) p. 298; C.H. Mitchell to Editor, Canadian Engineer, 38 (May, 1920) p. 472; "Classification and Remuneration of Engineers", ibid., 43 (Dec. 1922) p. 661.

[17] Andrew Charles Gross, "Engineering Manpower in Canada", (Unpublished Ph.D. Dissertation, Ohio State University, 1968) p. 24.

[18] Ibid.

[19] Retiring President's Address" (J.M.R. Fairbairn), Jour EIC, V (Feb. 1922) p. 95.

[20] Ibid.

[21] University of Toronto Archives, H.E.T. Haultain Papers, B 47 (B-72-005), Box #4, Fraser S. Keith, "Engineering Education", p. 5. By 1920, the Faculty of Applied Science and Engineering, University of Toronto, alone had over 800 students. By 1924, there were 2,091 engineering students in Canada. ("Hamilton Branch", Jour EIC, II [Jan. 1919] p. 34; Keith, "Engineering Education", p. 6). Some engineers believed that misinformation about the good career prospects for engineers accounted for the increase in the number of engineering students. See eg.: Edit. "Matriculation Standards", Canadian Engineer, 15 (Feb. 1908) p. 122; Hyman Goldman to Editor, ibid., p. 409. For an outline of the development of engineering schools, see: George Richardson, "Engineering Schools Enter a New Era", Engineering Journal, 59 (Sept./Oct. 1976) pp. 44-45.

[22] Gross, "Engineering Manpower in Canada", Appendix B, Table 2, p. 371.

[23] A.M. Reid, "The Twenties", in R.S. Harris and I. Montagnes (eds.), Cold Iron and Lady Godiva: Engineering Education at Toronto, 1920-1972, (Toronto, 1973) Table I, p. 53.

[24] R.E.W. Haggarty to Editor, Canadian Engineer 16 (Oct. 1909) p. 468; "Classification and Remuneration of Engineers", p. 661; "Discussion on the Law and the Engineer", Transactions of the Canadian Society of Civil Engineers, [hereafter cited: Trans CSCE] XXX (1916) p. 369.

[25] Calculated from "Statement of Membership", Engineering Institute of Canada, List of Members of the Engineering Institute of Canada, (Aug. 1919) p. 45; ibid., (Dec. 1920) p. 52; ibid., (Dec. 1921) p. VII.

[26] Peters, "Legislation Concerning the Status of Engineers", p. 218.

[27] R.O. Wynne-Roberts thought that licensing would attract, not limit the number of practitioners. Wynne-Roberts, "Engineering Prestige", p. 349.

[28] H.E.T. Haultain to Editor, Jour EIC, III (May, 1920) p. 261.

[29] R.O. Wynne-Roberts to Editor, Contract Record, 29 (Oct. 1915) p. 1040.

[30] Unlike previous attempts to acquire restrictive licensing powers, the EIC clearly recognized that they could only appeal for legislation on the grounds of protecting the public from incompetents. (G.N. Houston, "Troubles in the Engineering Profession", ibid., 30 [April, 1916] p. 379; Wynne-Roberts, "Engineering Prestige", p. 348; Peters, "Legislation Concerning the Status of the Engineer", p. 219). Other professionals also based their appeal for licensing and regulatory powers on the need to protect the public. (See eg.: Michael Bliss, "The Protective Impulse: An Approach to the Social History of Oliver Mowat's Ontario", in Donald Swainson's (ed)., Oliver Mowat's Ontario, [Toronto, 1972] pp. 184-185; A. Margaret Evans and C.A.V. Barker, Century One: A History of the Ontario Veterinary Association, 1874-1974, [Guelph, 1976] p. 63; Gullett, A History of Dentistry in Canada, p. 137). This appeal was founded on the notion that the public could not judge the competence of professionals. "The public needs protection", asserted one government engineer, "because they are not in a position to judge the ability of an engineer ..." Houston, "Troubles in the Engineering Profession", p. 379.

[31] Edwin T. Layton Jr., The Revolt of the Engineers: Social Responsibility and the American Engineering Profession, (Cleveland, 1971) pp. 6-7.

[32] R.W. Macintyre to Editor, Jour EIC II (March, 1919) pp. 226-227; cf C.B. McColl to Editor, ibid. (Jan. 1919) p. 32.

[33] Edit. "Would the Licensing of Engineers Raise Their Professional Status?", Contract Record, 29 (Jan. 1915) p. 27; Houston, "Troubles in the Engineering Profession", p. 380.

[34] "President's Address" (T.C. Keefer), Trans CSCE II (1888) p. 11.

[35] G.R.G. Conway, "Legislation and the Engineer", Contract Record, 29 (Jan. 1915) p. 47.

[36] Wynne-Roberts, "Engineering Prestige", p. 349; "Branch News", *Jour EIC*, I (Nov. 1918) p. 343; R.O. Wynne-Roberts, "A Generation of Engineering in Canada", *Canadian Engineer*, 38 (Jan. 1920) p. 172.

[37] "Branch News — Saskatchewan", *Jour EIC*, I (Oct. 1918) p. 296; "Branch News — Saskatchewan", *ibid.*, I (Nov. 1918) p. 344; "The Second Professional Meeting", *ibid.*, I (Sept. 1918) p. 225; edit. "Legislation", *ibid.*, I (Nov. 1918) p. 335; "Branch News — Saskatchewan", *ibid.*, I (Dec. 1918) p. 409; University of Toronto Library, CSCE Toronto Branch Papers, MS 102, Box #6 [hereafter cited: Toronto Branch Papers], "Minutes of Council, Special Meeting" (copy), 4 Dec. 1918; edit. "Summary of Legislation Situation", *Jour EIC*, II (Feb. 1919) pp. 120-121.

[38] "Branch News — Saskatchewan", *Jour EIC*, II (Feb. 1919) p. 129.

[39] Toronto Branch Papers, Box #7, "Resolution", Montreal Branch, 7 Jan. 1900; *ibid.*, W.S. Harvey to F.B. Brown, 4 Feb. 1919; "Report of Special Legislation Committee", *Jour EIC*, II (March, 1919) p. 173; Fraser S. Keith, "Engineering Legislation in Canada", pp. 21-22.

[40] *Ibid.*; See: "An Act Respecting the Civil Engineering Profession", *Jour EIC*, II (May, 1919) pp. 411-414.

[41] Toronto Branch Papers, Box #7, "Report, Committee on Legislation" (confidential), 11 April, 1919; "Niagara Peninsula Branch", *Jour EIC*, II (July, 1919) p. 528; C.E.W. Dodwell, "Engineers and Engineering", *ibid.*, III (March, 1920) p. 144.

[42] Toronto Branch Papers, Box #5, Aimé Geoffrion to Arthur Surveyer, 8 May, 1918; *ibid.*, "Report on Legislation Committee" (confidential), *n.d.*

[43] *Ibid.*, Geoffrion to Surveyer, 8 May, 1918.

[44] *Ibid.*, "Report of the Legislation Committee".

[45] See esp. "The Engineering Institute of Canada and the Provincial Associations of Professional Engineers", Engineering Journal, 26 (Oct. 1943) pp. 568-576; edit. "The Engineering Institute of Canada and the Provincial Associations of Professional Engineers", ibid., 14 (Oct. 1931) pp. 528-529.

[46] "Report of Council Meetings", Jour EIC, II (July, 1919) p. 522; edit. "Ballot on Legislation", ibid., II (Sept. 1919) p. 606.

[47] "G.H. Duggan, M.E.I.C.", ibid., II (June 1919) p. 460; "H.H. Vaughan, M.E.I.C.", ibid., pp. 461-462; "L.A. Thornton, M.E.I.C.", ibid., p. 462. Some senior EIC members disagreed with this prediction. See eg. C.C. Kirby to Editor, ibid., II (August, 1919) p. 567; "L.B. Elliot, M.E.I.C.", ibid., II (June, 1919) p. 462.

[48] "G.H. Duggan, M.E.I.C.", ibid., p. 461; "H.H. Vaughan, M.E.I.C.", ibid., p. 462. To a certain extent, Duggan and Vaughan were correct. Under section 7(i) of the model act, assistants, working under the direct supervision of a professional engineer and not taking responsibility for the work, were not considered to be practising professional engineers. (cf "An Act Respecting the Engineering Profession", ibid., p. 112). Although C.C. Kirby, a Legislation Committee member and a supporter of the model act, explained that s.7(i) was intended to exclude sub-professionals such as roadmen and draughtsmen, from the act — positions the Committee considered were roughly analogous to law clerks, for example — (C.C. Kirby to Editor, ibid., [July, 1919] p. 521) most junior engineers were unconvinced and vigorously protested the clause until it was revised. "Toronto Branch", ibid., p. 527; "Niagara Peninsula Branch", ibid., pp. 528-529; "Toronto Branch", ibid., III (Feb. 1920) p. 71.

[49] "G.H. Duggan, M.E.I.C.", p. 461; "H.H. Vaughan, M.E.I.C.", p. 462.

[50] See Professor Peter Gillespie's remarks: "Should Professional Engineers Organize Union?", Canadian Engineer, 38 (March, 1920) p. 283.

[51] Peters, "Legislation Concerning the Status of Engineers", p. 219. For the CMI's reaction to this re-

mark, see: edit. "The Status of Engineers", Canadian Mining Institute Monthly Bulletin [hereafter cited: CMI Bulletin], No. 78, (Oct. 1918) p. 838.

[52] Edit. "A Rose By Any Other Name Etc.", ibid., No. 70 (Feb. 1918) p. 83; edit. "EIC Seeking Closed Profession Says Mining Institute Secretary", Canadian Engineer, 35 (Aug. 1918) p. 189.

[53] Edit. "Legislation and Engineering", CMI Bulletin, No. 77 (Sept. 1918) p. 745.

[54] Edit. "A Rose By Any Other Name Etc.", ibid., p. 83.

[55] F.S. Keith to Editor, CMI Bulletin, No. 77, (Sept. 1918) pp. 806-807.

[56] Council Minutes, CMI, 17 Jan. 1919, p. 306; Toronto Branch Papers, Box #6; Minutes of Council Special Meeting — Copy, 4 Dec. 1918, n.p.

[57] "Legislation for Engineers", CMI Bulletin, No. 84 (April, 1919) p. 374.

[58] See: "Status of the Engineer", Canadian Mining Journal, 41 (March, 1920) p. 212.

[59] Council Minutes, CMI, "Report of Committee on Engineering Legislation", 17 Feb. 1920, p. 384.

[60] Edit., "Legislation and Engineering", CMI Bulletin, p. 745.

[61] See: J.A. Reid to Editor, Jour EIC, III (Feb. 1920) p. 91.

[62] Edit. "Professional Mining Engineers", Canadian Mining Journal, 43 (Nov. 1922) p. 761; edit. "Status of the Engineer", ibid., 41 (Feb. 1920) p. 168.

[63] Edit. "What Do Mining Engineers Think About Engineering Status Legislation?", *ibid.*, 42 (May, 1921) pp. 375-376.

[64] Council Minutes, CMI, 29 Jan. 1920, pp. 375-376; *ibid.*, 1 May, 1920, p. 292; *ibid.*, 21 Jan. 1921, p. 37; "Status of Engineers — Discussion", *CMI Bulletin*, No. 95 (April, 1920) p. 292; edit. "What Do Mining Engineers Think About Engineering Status Legislation?", p. 375.

[65] Edit. "Engineering Legislation", *Jour EIC*, II (Oct. 1919) p. 680; "Report of Council Meeting", *ibid.*, p. 689; Fraser S. Keith to H. Mortimer Lamb, *CMI Bulletin*, (Nov. 1919) pp. 1154-1155. Mortimer Lamb felt that the EIC had broken their agreement with the CMI by allowing EIC branches to proceed individually with legislation. He requested CMI branches not to co-operate with EIC branches until both the CMI Council and branches had carefully considered proposed bills. To this end, he advised the branches to appoint special legislation committees to study provincial bills and to report the branches' views to Council. See: Council Minutes, CMI, 20 Oct. 1919, p. 351.

[66] Edit. "Engineering Institute's Convention at Montreal", *Canadian Engineer*, 42 (Jan. 1922) p. 187.

[67] G.R.G. Conway, "The British Columbia Engineer", *ibid.*, 25 (Oct. 1913) p. 639; C.H. McLeod, "How Canadian Engineers Organize", p. 342; Toronto Branch Papers, Box #5, Letter to D. Blanchard, 18 Jan. 1918, *ibid.*, H.H. Vaughan to P. Gillespie, 22 Feb. 1918.

[68] "Report of Council Meeting", *Jour EIC*, I (Aug. 1918) p. 171. Since most qualified professional engineers in Saskatchewan and Manitoba belonged to the Saskatchewan and Manitoba EIC Branches, no provincial divisions were organized in these provinces. Toronto Branch Papers, Box #5, Vaughan to Gillespie, 22 Feb. 1918.

[69] For background on the Advisory Conference Committee, see: "Ontario Provincial Division EIC", *Canadian Engineer*, 37 (Nov. 1919) p. 500; "Advisory Conference Committee on Engineering Legislation for Province of Ontario",

ibid., 38 (April, 1920) p. 365; "Report of Ontario Committee on Legislation", ibid., 39 (Dec. 1920) p. 631; J.B. Challies to Editor, Jour EIC, III (March, 1920) p. 148; "Ontario Provincial Division", ibid., II (Dec. 1919) p. 792; "Ontario Provincial Division", ibid., (Jan. 1920) p. 23; "Advisory Conference Committee on Engineering Legislation in Ontario", Canadian Mining Journal, 41 (April, 1920) p. 318.

[70] The Ontario Association of Architects later withdrew in order to pursue their own licensing legislation. "Report of the Ontario Committee on Legislation", Canadian Engineer, 39 (Dec. 1920) p. 631.

[71] Edit. "Legislation and Engineering", p. 746.

[72] See Chapter VII, pp. 226-227.

[73] The J.C.T.O. was formed to co-ordinate the work of scientifically and technically trained men in furtherance of the war effort. For background, see: edit., "Joint Committee Doing Valuable War Work", Contract Record, 32 (April, 1918) p. 269; "Joint Committee of Technical Organizations", Canadian Mining Journal, 41 (Feb. 1920) p. 148; "The Engineer's Opportunity for Patriotic Service", Contract Record, 31 (Jan. 1917) p. 2; edit., "Technical Men and the War", Electrical News, 26 (Jan. 1917) p. 19; "Joint Committee of Technical Organizations", ibid., 27 (April, 1918) pp. 27-28; "Joint Committee of Technical Organizations Hold Successful Annual Meeting", ibid., 28 (April, 1919) pp. 32-34.

[74] For a description of the origin, structure and work of the CSA, see: Canadian Engineering Standards Association, Yearbook 1927 (Ottawa, 1927) pp. 6-10.

[75] Under the JCTO bill, the different branches of engineering would be governed separately by a board of engineers acting under the direct control of a government department. See: "Status of the Engineer", CMI Bulletin, p. 288; J.B. Challies to Editor, Jour EIC, III (March, 1920) p. 148; "Report J.C.T.O. Status Committee", Canadian Engineer, 37 (Dec. 1919) pp. 517-518; Unsigned Letter to Editor, Jour EIC, III (Feb. 1920) pp. 91-93.

[76] Edit. "Professional Legislation in Ontario Delayed", Canadian Engineer, 40 (May, 1921) p. 447.

[77] For a text of the Ontario bill, see: "Engineering Legislation for Ontario", Electrical News, 31 (Jan. 1920) pp. 35-40.

[78] Gray had twelve years experience in municipal engineering and highway construction, in addition to two years active service with the Canadian Railway troops. "Personals", Jour EIC, II (Nov. 1919) p. 743.

[79] "Professional Legislation in Ontario", Canadian Engineer, 42 (March, 1922) p. 314. For a detailed outline of the progress of the Ontario Bill, see Willis Chipman's report to the Advisory Conference Committee: "Legislation in Ontario", Engineering Journal, V (August, 1922) pp. 427-428.

[80] Ibid., p. 427.

[81] See: "The Professional Engineers' Act of Ontario", ibid., 5 (July, 1922) p. 369.

[82] "Legislation in Ontario", ibid., p. 428.

[83] Ibid., p. 370; Appendix D to the Research Directorate's Staff Study, "The History and Organization of the Engineering Profession in Ontario", prepared for the Professional Organizations Committee, Ministry of the Attorney General, Ontario, p. 4.

[84] Quoted in "Engineering Legislation", Canadian Mining Journal, 42 (Dec. 1921) p. 1012.

[85] "Engineering Legislation", ibid., p. 1013.

[86] R.E. Hore, "An Equal Chance", ibid., 41 (April, 1920) p. 265. These remarks were inspired by Herbert Hoover's inaugural address to the American Institute of Mining and Metallurgy. See: ibid., pp. 264-265.

[87] "Engineering Legislation", p. 1013.

[88] Saskatchewan engineers faced strong opposition from the public and the government. Some farmers, for example, believed that the bill would prohibit them from building small bridges and other similar works. While the government would support some form of registration, especially to protect the title "Professional Engineer", granting engineers exclusive powers to control the profession was strongly opposed in principal. "Saskatchewan, Engineering Progress on Act", Canadian Engineer, 39 (Dec. 1920) p. 615; "Saskatchewan's Bill Fails to Pass", ibid., p. 629; "Engineering Legislation Making Progress", ibid., 38 (April, 1920) pp. 354-355; "Saskatchewan Engineers Will Incorporate", ibid., (May, 1920) p. 441; "Saskatchewan Branch", Jour EIC, III (May, 1920) p. 269; "Report of Council", ibid., IV (Feb. 1921) p. 70; "Annual General and Professional Meeting", ibid., (March, 1921) p. 194.

[89] An Act to Incorporate the Association of Professional Engineers and for Other Purposes Connected Therewithin, Statutes of Prince Edward Island, 1955, c.43.

[90] Fraser S. Keith, "Engineering Legislation in Canada", p. 23; "Engineering Legislation Making Progress — Quebec", Canadian Engineer, 38 (April, 1920) p. 355.

[91] For an analysis of these acts, see: Keith, "Engineering Legislation in Canada", pp. 23-24.

[92] "Engineering Legislation Making Progress — Alberta", Canadian Engineer, p. 354; Arthur L. Ford, "The Legislation Situation in Alberta", Jour EIC, III (June, 1920) pp. 310-311; edit. "Engineering Legislation in Alberta", Canadian Engineer, 39 (July, 1920) p. 168.

[93] See: An Act to Amend and Consolidate the Engineering Profession Act, Statutes of Alberta, 1930, c.30, s.6, and An Act to Regulate the Professions of Engineering and Geology, ibid., 1955, c.74, s.45(a).

[94] "Toronto Branch", Engineering Journal, V (Nov. 1922) p. 554.

[95] Evans and Barker, Century One, p. 171; Appendix C to the Research Directorate's Staff Study, "History and Organization of the Architectural Profession in Ontario", (prepared for the Professional Organizations Committee, Ministry of the Attorney General, Ontario), pp. 8-9.

[96] Appendix D, "History and Organization of the Engineering Profession in Ontario", pp. 4-6.

CONCLUSION

Canadian engineers believed that they should govern society; but, instead of inheriting the earth, the "pioneers of civilization and progress" languished ignominiously 'on tap', not 'on top'. Unable to control their destiny, or protect themselves from competition, engineers adopted a strategy of professional development to increase their status. They cultivated esoteric technical knowledge essential to the new urban-industrial order and institutionalized their expertise in an elite engineering society. By 1918, however, as overcrowding intensified competition, wartime inflation appeared to undermine their status. Moreover, various earlier initiatives to raise their status had failed. Rejecting unionization, engineers campaigned for licensing to achieve the same end as unionization. Posing as professionals protecting the public interest, they eventually obtained substantial monopoly powers through licensing, without resorting to 'undignified' restrictive trade practices.

The engineers' licensing associations were manifestations of the new urban-industrial order. Emerging during an era of dramatic social change accompanying rapid industrialization, they were part of a larger collectivist assault on the ideals of laissez faire. Organized to restrict competition and monopolize practice, they were the middle-class counterparts to trade unions, business associations and combinations. They arose from a long struggle between two competing concepts of professionalism within the Canadian Society of Civil Engineers/Engineering Institute of Canada and represented the triumph of younger protectionist engineers over older laissez faire proponents. This victory heralded the rise of an aggressive, self-confident 'new middle-class' in Canada and the Western World. It also signalled the decline of traditional notions of professionalism.

The professionalism associated with doctors and lawyers represented the pre-industrial past. It was based on individual personal relations and governed by gentlemanly conduct and philosophical idealism; whereas the new middle-class experts represented the emerging urban-industrial order. Their expertise was collective and impersonal. They were concerned with bureaucratic functionalism and the exact techniques of social management. They were singularly dedicated to the attainment of economy and efficiency for their own sake and impatient to bring the world into conformity with their values. They fostered the notion that society could be 'engineered'; that science, not common sense, should determine social policy and, above all, that experts, not popularly elected amateurs, should manage the new urban-industrial order.

These ideas were elitist and anti-democratic, perhaps anti-humanitarian and authoritarian. Neither democrats nor aristocrats, philosopher kings nor even wilful Übermenschen, the middle-class experts assumed that they were above politics and conventional morality; that they functioned passively as the impartial servants of a higher scientific rationality in quest of an efficient and orderly new Jerusalem. They transvaluated the traditional national precepts of order and authority into a new order based on science, a new authority based on themselves. Although engineers never realized their goal of social leadership (except indirectly, perhaps, through C.D. Howe), by 1922, the engineer had emerged as the pre-eminent middle-class expert. He was the quintessential technocrat — "The Master Spirit of the Age".

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